Editorial

ONCE more the penalty for operating an unlicenced transmitter has been brought to public notice through the prosecution in civil courts of a lad who should have known better.

Apparently he had come by some surplus Service equipment, not a difficult matter these days, when quantities of Disposals transmitters are being sold over the counter of many radio stores.

We are not quarrelling with this practice. There are some who consider the easy availability of these transmitters is an encouragement for unauthorised persons to use them. But then it is so easy to build a simple transmitter from ordinary receiver parts that anyone with an elementary knowledge can do it without spending money on ready-built gear, which isn't available as cheaply as all that.

We do not consider this, or any other excuse, is valid today. The veriest schoolboy who picks up enough knowledge to operate a transmitter of any kind is aware that some call-sign is required, and knows quite well that he needs a licence before he can transmit messages. In this case an amateur call-sign was used, one which apparently had not yet been allotted by the PMG.

Personally, we think the offender in this case got off very lightly. That must be interpreted as a nice gesture on the part of the powers that be, for he certainly left himself open to much severer penalties.

For the benefit of any of our readers who may be tempted to operate transmitters without observing the requirements of the law, we would point out that if they are keen enough they should find out from their local Wireless Branch the details of the Amateur Operator's Certificate of Proficiency, which calls for an examination in radio theory and Morse code. On successfully passing the rather simple examination, they will be given their own call-signs, and may then "go on the air." Apart from special licenses of a commercial nature there is no other way to do it without ending up in serious trouble.

Cases of this kind do great harm to the large body of amateurs, or licenced experimenters, to use the Departmental term. Invariably the newspaper reports refer to these pirates as "amateurs", whereas in fact they are merely members of the general public breaking the law, and not amateurs at all.

It is in the interests of all concerned, and amateurs in particular, that all suspected cases of piracy should be promptly reported to the authorities. There is no question of informing on a neighbor. There is a law against the practice, just as there are other necessary laws to maintain order. It is the duty of every citizen to see that law-breakers are dealt with in the community's interest.

Amateurs themselves should keep a watch for these pests. I don't think there is a better word for them. If pirates knew that no other amateur would work with them, their activities would receive a decided check. At the moment, there is no reason to suspect there are more than a few offenders. Let us see that their ranks are not given a chance to grow. Get your own amateur "tickets", you fellows. You can then have all the fun you like, preserve your self-respect, and keep out of the police courts.

John Moyle

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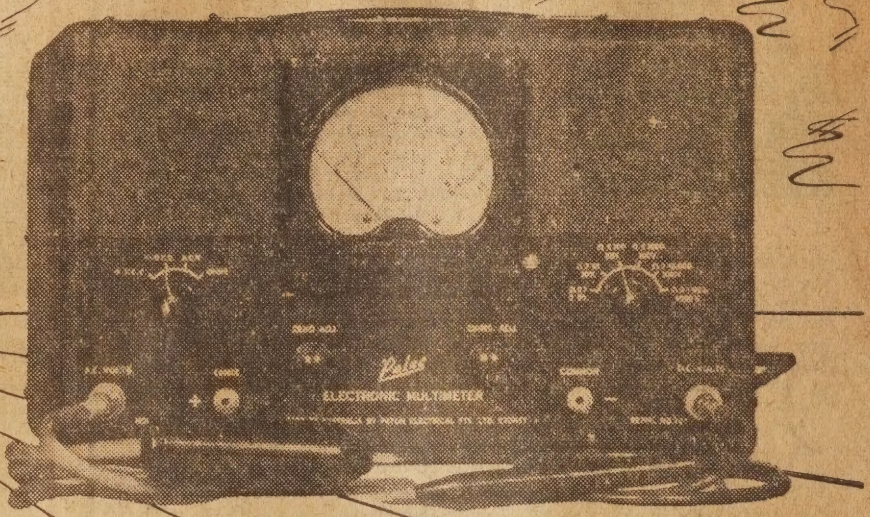

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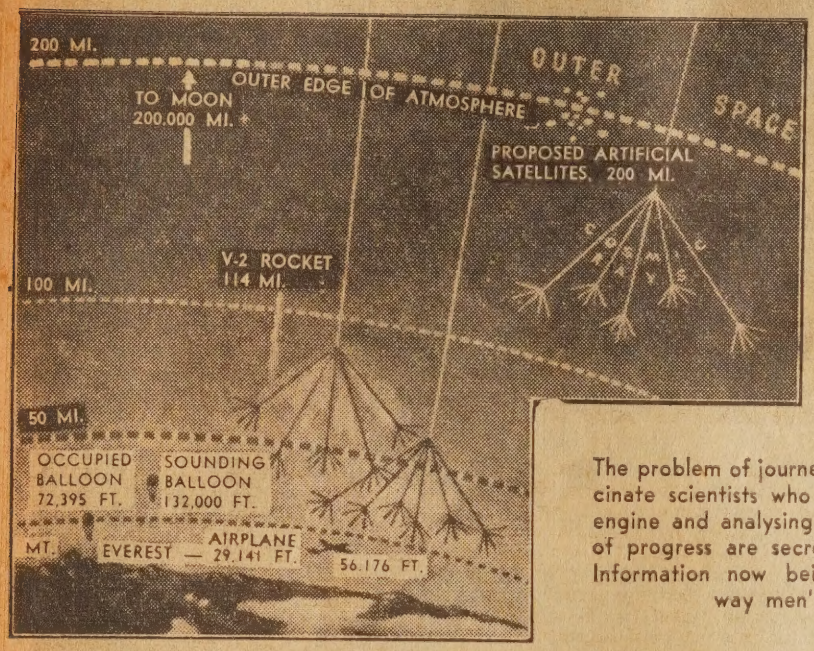
P.13.FP

RADIO MAKES COOKING SHORT WORK

STEAKS RADIO COOKED—Edith Adams, a pretty dish herself, holds a plate of mouth-watering inch steaks cooked by radio-frequency energy in an oven that bombards them with infra-red radiations. Designed for use in commercial preparation of food, officials of the company which manufactures the machine report that engineers are working on a model for home use. In the electronic cooker radio waves create infra-red radiations which penetrate to the centre of the food, speeding up cooking time. These steaks were cooked in less than a minute. The Federal Communications Commission of USA recently authorised a band of frequencies between 2400 and 2500 megacycles for such electronic apparatus.

ROCKET PROPULSION STILL FAVOURED



This diagram shows progress being made in examination of the outer space. It indicates the region of intense cosmic ray activity into which projectiles may soon penetrate. Many factors, known and unknown, must be examined and considered before man himself makes the trip.

The problem of journeys into outer space continues to fascinate scientists who are at work developing the rocket engine and analysing the problems involved. Full details of progress are secret because of defence implications. Information now being published, however, shows the way men's thoughts are trending.

THE design of a suitable space ship, as it is taking form is described here, with some of the design facts as outlined. It is estimated that within 15 years something like it will set out for the moon, minus a crew, no doubt carefully watched, and maybe controlled by radar.

A number of separate rocket motors and controls, make up the power plant. The first motor, or stage, pushes the ship up a few hundred miles, when, its fuel exhausted it is dropped off. The second stage then starts automatically and accelerates the ship until it uses up its fuel and is jettisoned.

This process continues, each stage adding more speed, until the last stage completes the job of getting the 22,000-mph velocity needed to escape from the earth's gravitational pull. Once free of the earth, the space ship can coast to the moon (there would be no air resistance). Only a little power would be needed for steering.

MULTI-STAGE ROCKETS

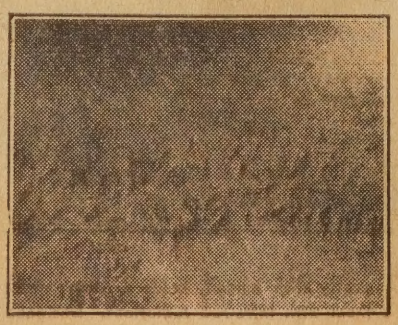
The multi-stage system eliminates the dead weight of big, almost-empty fuel tanks and seems to offer the most economical method of securing extremely long range. Tests of one of the first practical rockets of this type have already been made.

This rocket, the Tiamat, developed by the USA National Advisory Committee on Aeronautics, has two stages. One of its most important features is an accurate control system that permits it to be flown through fairly complicated manoeuvres. Although quite small—less than 15 feet long and weighing about 600 pounds—it is probably a good indication of the design of the moon rocket of the future.

The jump from the Tiamat's 600-mph speed to the 22,000 mph needed for a trip to the moon is a big one, but not impossible. Twenty-two thousand miles-an-hour is not as fantastic a speed as it seems. The single-stage V-2 already gives 3500 mph, and succeeding stages would have the big advantages of reduced gravitation and complete absence of air resistance—both important factors.

Not that you can ride to the moon by hitching three V-2s together. If a multi-stage rocket uses a V2 for the

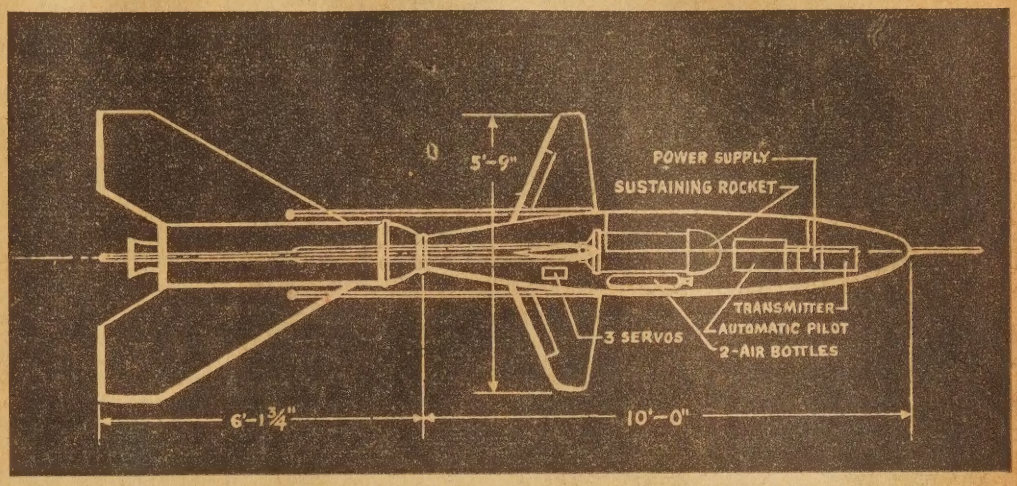
Photo taken soon after the rocket started its ascent looks much like an aerial photo taken from a plane.



From altitude of 60 miles the earth's mountain ranges and valleys look like wrinkles to the rocket's camera.

At 65-miles altitude the horizon is 720 miles away. Cloud layers seem to hug the earth.

TO SOLVE OUR OUTER SPACE MYSTERIES



Right: In the Tiamat, one of the first multistage rockets tested, the second stage is simply fastened to the front end of the first stage without the involved nesting arrangement needed for a moon rocket. Below: The Tiamat takes the air on a test run.

first stage the pay load in the final stage is a steel fragment smaller than a dime. Engineers can also calculate how big a ship able to reach the moon would be if its final stage were a V-2. Alfred Africano, pioneer in rocket development and now project engineer for the Curtiss-Wright Corporation, did the arithmetic. The answer is 5,500,000 tons.

NEW FUELS

But these calculations are based on the motor and fuels employed in the V-2. Although this power plant is the most efficient now known to be in use, it still needs nine tons of liquid oxygen and alcohol and four tons of motor and airframe to lift a one-ton pay load. Much higher efficiencies are reported to be possible with fuel and motor combinations already being tested by the rocket researchers.

Better fuels—that is, hotter fuels—have been available for a long time. Rockets run on heat. The hotter the gases in the combustion chamber, the greater their pressure, the higher their speed as they shoot out the nozzle, and the faster the rocket is pushed ahead.

On that basis, hydrogen and oxygen would make the most effective fuels. When these two elements combine to form water, the reaction releases more heat per pound than any other now known. The best rocket would actually be a steam engine! Using hydrogen and oxygen as fuels, a moon rocket would need only five stages, according to the calculations of Martin Summerfield, of California Institute of Technology, a leading American authority on rockets. It would be 72 feet long and would weigh about 25 tons, about twice the size of the V-2.

Yet the tremendous heat available in oxygen and hydrogen—the characteristic that makes them so desirable—is the very reason they are not used. No lightweight motor can stand that temperature.

Present rocket motors are cooled by double-walled jackets through which one of the fuels is pumped. The fuel takes the heat away from the motor and at the same time is warmed up itself for easier burning in the chamber. Ethyl alcohol, the V-2 fuel, works very well; its rate of burning (which determines how fast it is pumped through the cooling jacket) is about the same as its rate of heat absorption. For hydrogen, this is not true. It absorbs less heat per pound and must therefore be pumped through the cooling jacket, and burned, faster. The result is an inefficient flame—or else the motor burns out.

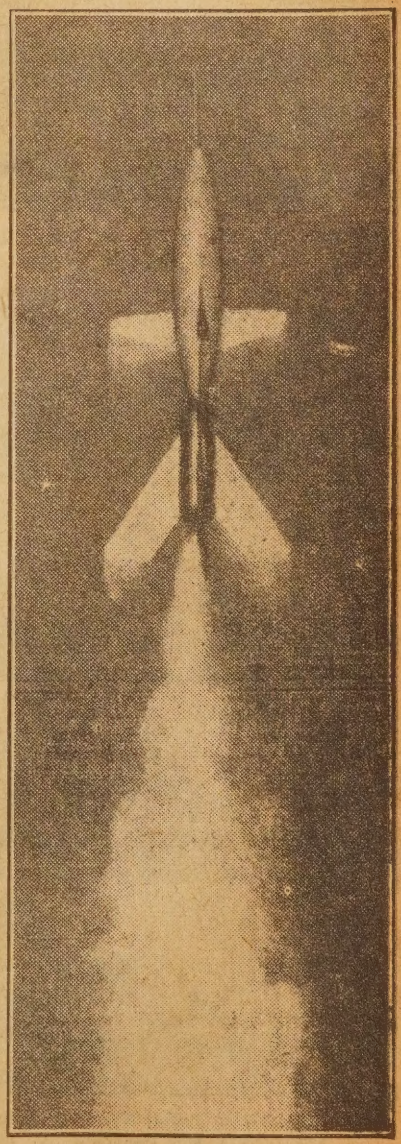
If hotter fuels are to be used, new heat-defying motors must be made. Research in that direction has already been quite successful.

As for danger, there would be plenty of it. The foreseeable risks—such as running out of fuel, getting lost, breakdown of the air-conditioning system, &c.—are probably minor compared to the hazards we won't know anything about until after a trip is actually made. The harm to be expected from cosmic rays, those high-speed particles so plentiful in the upper atmosphere, is already being measured by instruments carried in V-2s. The danger of running into a stray meteor can be forgotten; the chances are a million to one against it.

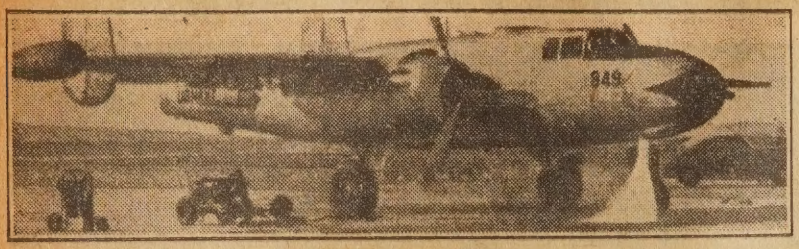
SPACE TRAVELLERS

These first space travellers will find their itinerary all set, and complete with road maps. The astronomers, already well acquainted with at least one side of the moon, want to know what lies under the dense clouds that completely obscure the planet Venus; what is on Saturn, always hidden by its big rings of satellites; and what is the meaning of those strange lines on Mars—the so-called "canals."

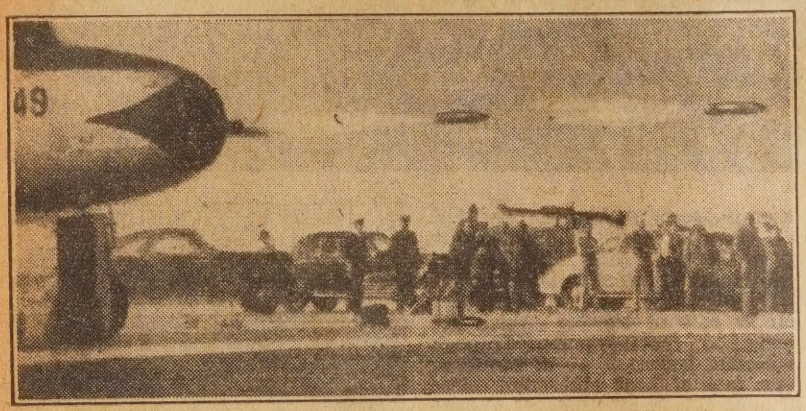
But the moon would probably be the first stop on any space route. First of all, it's close. The 240,000-mile trip could be made in about 12 hours by a rocket travelling 22,000 mph, the final



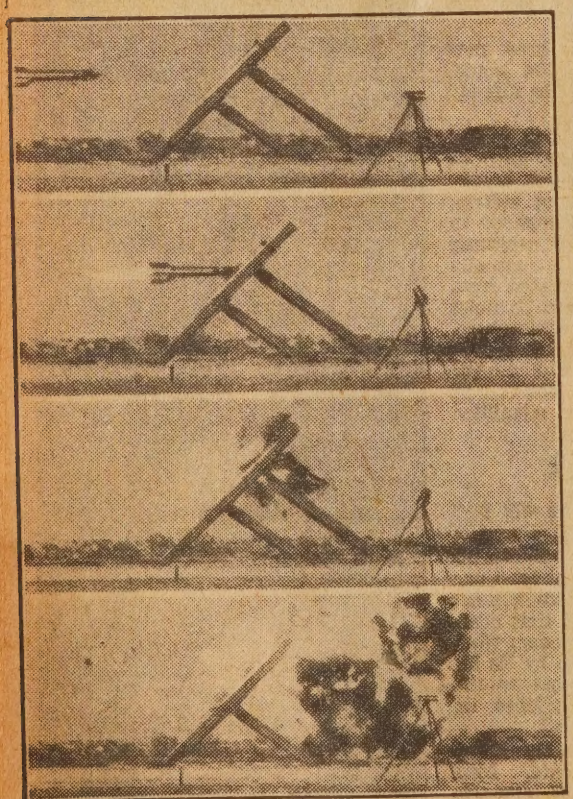
ROCKETS IN FIGHTER AIRCRAFT



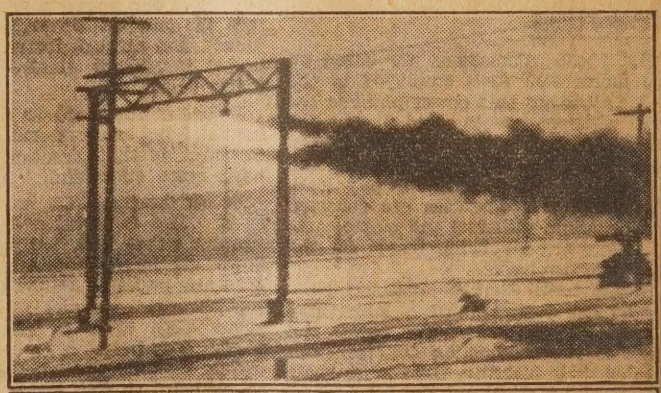
Rocket armed aircraft are now commonplace. Note the flame jet through the exhaust stack of this aircraft before the rocket leaves the tube.

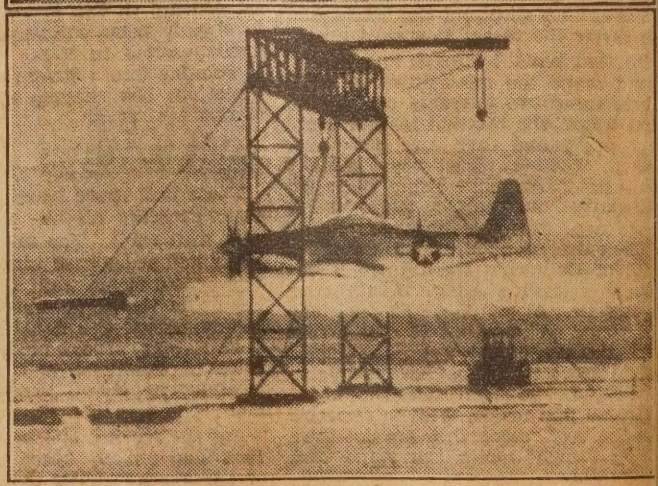


Two rockets are seen leaving the firing tube during a test of a new type in USA.



An armor piercing rocket shown piercing a 2½ inch armor plate and exploding just beyond.





Top—a big 14 inch rocket in flight just after leaving its guide rails. Bottom—the same rocket fired from a fighter aircraft.

speed needed to shake free from the earth.

And we already know a great deal about the moon—more than we know about some parts of the earth, in fact. Its geography has been fairly accurately mapped (but only on the side facing the earth; the other side is a complete mystery). Its temperature has been recorded. It has little or no atmosphere.

The moon's small size, which gives it a gravitational pull one-fifth that of the earth, is another advantage. Less power would be needed to get away for the return trip.

NOT TOMORROW!

But all these plans must wait for the two basic elements; more powerful, lighter fuels; and motors to withstand their heat and pressure. So don't rush to your travel agent. You won't be able to buy a ticket for the moon tomorrow, or even the next day. But the day after that . . .

In the meantime, rocket propulsion for missiles of warfare is being developed to a high degree. The pictures on this page give an idea of just how deadly they can be. Although many successful rockets were used during the last war, they were babies compared with some of those now ready for use. Guided by radio, they are one of the last war's most deadly developments.

One more example of how the same scientific principle can be applied to peace and to war, to the pursuit of knowledge or the race to destruction.

Technical Review

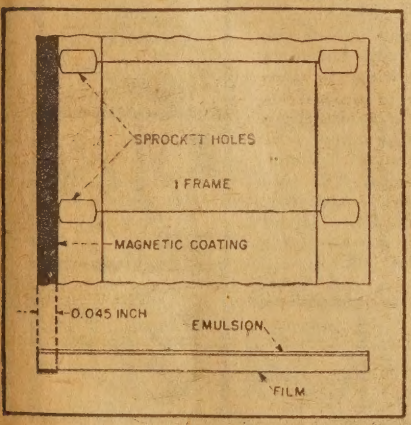
MAGNETIC SOUND FOR AMATEUR MOVIES

The development of a new magnetic recording medium has made it possible to record a sound track on 16mm. movie film either before or after processing. At normal film speed, a frequency response of from 50 to 5000 cycles is claimed.

ANNOUNCED recently by the Amour Research Foundation, the new recording has a grain size of less than one micron, but, nevertheless, has a high coercive force. It is applied to the film as a track 0.045 inch wide and .0005 inch thick.

The coating makes the film thicker on one edge than the other, but this leads to no reeling difficulties in practice. Actually a second coating can be applied to the opposite edge and left blank, or used as a second track or even employed for stereoscopic reproduction effects.

By placing the track on the unsprocketed side of 16mm sound film,

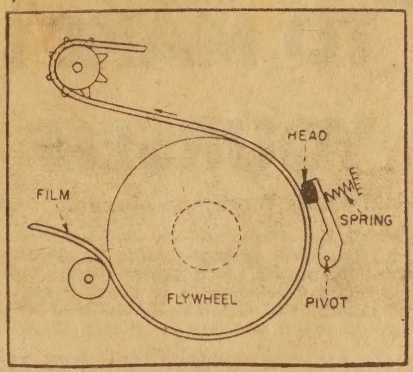


Mounting arrangement for a magnetic pickup head. The pressure against the coating is of the order of .0001 ounce.

a wider track could be employed which would give improved quality of reproduction. The material is not affected by photographic chemicals used during processing, so that the recording can be made before or after the completion of the film.

This offers very attractive possibilities for amateur photographers, since it reduces drastically expensive commercial processing of visual and sound sections.

The magnetic head used to play back the sound is pressed lightly by a spring against the film, while it rides on a flywheel stabiliser. The necessary type of head can be mounted



Suggested position for the sound track along the edge of a 16mm. film. A second track can be applied to the opposite edge.

easily on a conventional projector and can be connected to any suitably "padded" AF amplifier.

By switching circuits, the same head can be used for erasing, recording or playback.

To erase, a strong 40 Kc. signal is fed to the head while the film is run through the projector. A smaller amount of this same voltage is used as a high frequency component during the recording process. As previously stated, the optimum frequency response claimed at conventional sound film speed is from 50 to 5000 c/s, with background noise approximately 35 or 40 decibels below average programme level.

The system is applicable also to 8mm. film, the same size strip being applied between the edge of the sprocket holes and the edge of the film. The slower speed limits the frequency response to 2500 c/s, but, for all that, speech and musical quality can compare with that heard from a mediocre radio receiver ("Electronics," March, 1947).

NOVEL KEYING MONITOR

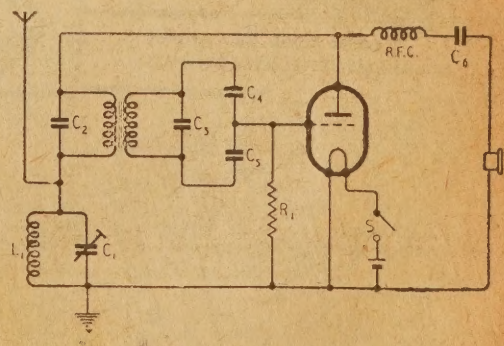
A KEYING monitor described in "Wireless World" by W. A. Roberts, makes possible a continuous check on transmitter operation without introducing serious problems of frequency stability.

It is pointed out that a high degree of stability is necessary in the usual beat frequency type of monitor if the necessity for continual re-adjustment is to be avoided. On the other hand, audio oscillators keyed simultaneously with the transmitter provide a check on operating style but do not give warning of a breakdown in the transmitter.

The device suggested by Roberts is essentially an audio oscillator which derives its high tension supply by rectification of the carrier. The note is determined chiefly by the audio components, thus avoiding wide variations arising from frequency drift in either transmitter or monitor.

The tuning circuit can utilise switched or plug-in coils and arranged to cover all necessary bands. The signal pickup is controlled by varying the length of a short vertical aerial.

The circuit arrangement shown was found to suit best the audio transformer used by the writer, including the artificial tapping down of the grid through condensers C4 and C5.



However, this can be varied to suit. Condenser C2 can be about .0001 mfd. and C6 about .001 mfd. Condensers C3-6 must be selected experimentally to give good oscillation and a suitable tone. Usual value for resistor R1 is about 50,000 ohms.

A telephone earpiece could be used as a midget loudspeaker.

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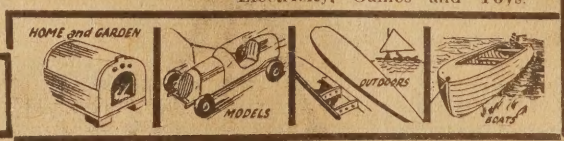

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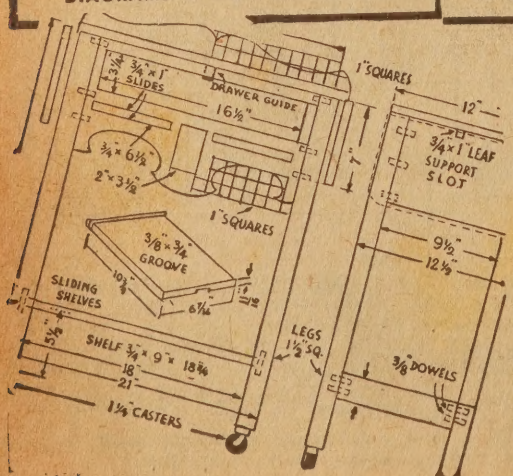

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250-300 MC. JAP RADIOPHONE

For short-range communication the Japanese developed a transceiver operating on frequencies between 250 and 300 Mc. Its design should be of interest to amateurs, since it uses standard valve types.

KNOWN as the Type 96, Mark 7, this transceiver was designed for receiving and transmitting voice and interrupted-continuous-wave in a frequency range of 250 and 300 mc.

A 955 acorn tube acts as a super-regenerative detector in an Ultraudion oscillator circuit for receiving, and as a plate-modulated oscillator for transmitting. A 6F7 triode-pentode acts as a 300kc. quench oscillator and audio amplifier for receiving, and as a tone generator or modulator for transmitting.

The range is given as five miles under ideal conditions.

The high-frequency unit is mounted in a box suspended in front of the parabolic reflectors of the array. The low-frequency unit and controls are mounted behind the reflectors and above the centre of the tripod.

Power for the set is supplied by a 6-volt storage battery and a 180-volt B-battery, housed in the box on the ground beside the tripod.

The antenna reflector system consists of nine dipoles tuned to the middle of the tuning range (272.7mc.). The driven element is a pair of adjustable dipoles screwed into the sides of the high-frequency unit.

CIRCUIT OPERATION

The modulation switch (the several sections of which are shown ganged in the circuit) has three positions; the centre position is OFF and no plate for filament voltages is applied to the tubes. When the lever is moved away from the operator, the circuit is set up for reception of voice and interrupted-continuous-wave signals. If the send-receive button is pressed while the modulation switch is in this position, the circuit becomes a transmitter operative for voice transmission only.

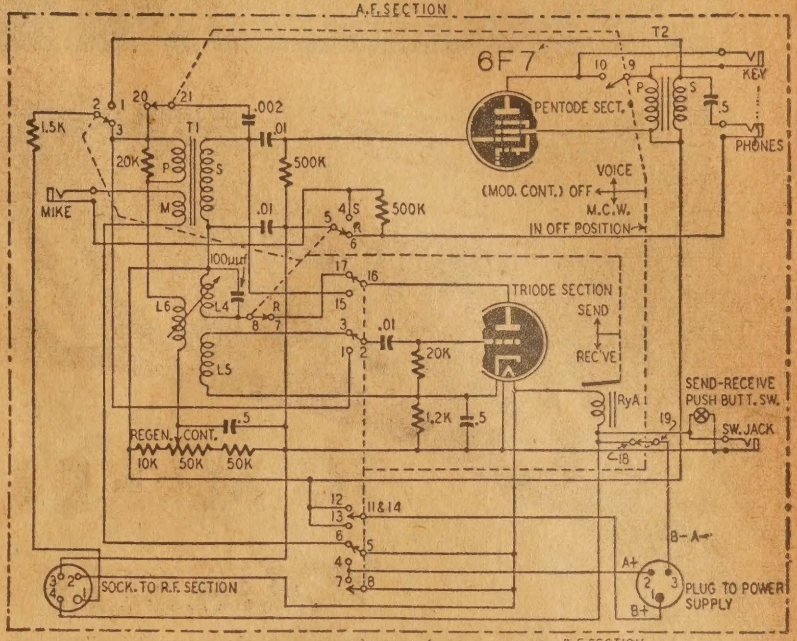
When the modulation switch is thrown toward the operator, the set becomes a transmitter for tone-modulated c.w.

When the set is used for receiving, the incoming signal is concentrated on the dipole by the reflectors and coupled to the grid of the 955 through the tank coil L1. At the plate, the signal is mixed with the quenching voltage from the triode section of the 6F7 so that the 955 becomes a separately quenched super-regenerative detector.

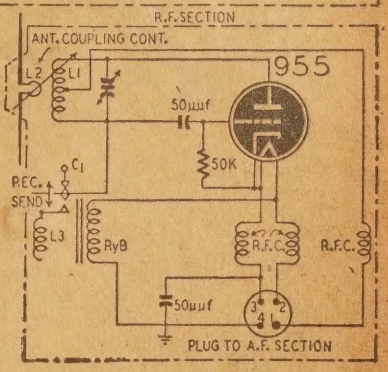
The a.f. signal at the plate is coupled through transformer T1 to the pentode section of the 6F7. Transformer T2 couples the plate to the headphones.

The quenching voltage is generated in coils L4 and L5 and the triode 6F7. Coupling to the detector is controlled by the position of L6.

To transmit voice, the modulation switch is moved away from the operator. Pressing the send-receive switch



The R.F. section above and, on the right, the R.F. section of the Mark 7 transceiver. It is shown below assembled and ready for operation.



shifts relays Ry-a and Ry-b to the transmit position. This removes the plate voltage from the triode section of the 6F7 by opening contacts 7-8.

The output of the microphone is impressed on the low-impedance primary of M of T1. The secondary voltage of the input transformer feeds the grid of the pentode section which has become the modulator stage.

The plate current of the 955 passes through the secondary of T2, through contacts 1-2 to the plate of the oscillator. The output of the modulator fully modulates the plate current of the 955.

Sidetone for the monitoring is secured by coupling the headphones to the secondary of T2 through a 0.5-uf blocking condenser.

Tone-modulated transmissions are made with the modulation switch in the i.c.w. transmission position. Contacts 15-16 and 1-2 are closed, making the triode section of the 6F7 an audio oscillator using the primary and secondary windings of T1 to supply the necessary grid-to-plate coupling. Contacts 9-10 are opened so that plate voltage is applied to the pentode section only when the key is closed. The signal from the a.f. oscillator is amplified by the pentode section which functions as a modulator just as it does during voice transmissions.

Although the Mark 7 was designed for specific military application its circuit might be used as a basis for an amateur transceiver for operation on the 144-, 220-, and 420-megacycle bands.

Coils for the u.h.f. ham bands are wound with No. 18 wire on a ½-inch form. (Silver-plated wire is more efficient, particularly on the higher frequencies). The 144mc. coil has four ½-inch turns spaced to approximately ¾-inch and the 220mc. coil has two turns spaced to ½-inch. — From "Radio Craft."

BREAD—THE STAFF OF LIFE IS ONE

Bread has been the staple food of mankind for thousands of years and is rightly termed the "staff of life" and although man "Does not live by bread alone" he finds it difficult to forsake the custom which insists that there must be bread with his meals no matter what other food he partakes of in addition

by Calvin Walters

BEHIND the manufacture of bread there is an interesting story which starts somewhere in very remote times. The remains of many stone ages reveal that bread was used by early man. We know very little about the Stone Age man, but this we do know—he made bread from grain crushed between stones and baked. Hard, burned cakes, together with the crude instruments with which he crushed the grain, have been found in caves originally inhabited by these people.

STONE-AGE CAKES

The cakes were made from barley, oats, millet and wheat. The grain having been crushed between stones, was mixed with water, spread over a hot stone and ashes heaped upon it. The result was rather a gritty, coarse cake, but man in those days was blessed with a decent set of teeth with which to dispose of the substance. Today we are much better off and progress has so modified our requirements that it is not now necessary to have teeth at all, for the demand for fresh bread straight from the ovens is very great and this diet needs no chewing.

One of the earliest breads was made from acorns. This was a favorite dish of the American Indians, who were wise enough to know how to remove the bitter substance contained in the acorn, by washing out in boiling water. The remaining crushed kernel was dried in the sun. The heat of the sun was also used for baking the bread, or it was baked over a fire.

Over 5000 years ago the Egyptians knew how to bake bread. They were a little more artistic than the Stone Age people and made the bread into small rolls, slightly flattened like a muffin. These people also knew the art of making leavened bread, or bread with a yeast content something similar to that used today. White bread was popular also. There are indications that the craze for white bread began in those far off days, and although we are supposed to have progressed since then, we have not learned much, for white bread, also the most popular variety today, is quite deficient in many desirable qualities possessed by wholemeal bread.

WOMAN'S JOB

In bygone centuries, the job of making bread was allotted to the woman of the house, as the husband was forced to devote his time to hunting, herding the cattle, or the acquisition of scalps or the skulls of his enemies. Women, therefore, saw to it that her man was well fed for these important tasks. She did all the agricultural work, dug the soil, sowed the grain, reaped the harvest, made the bread, collected edible fruits and roots from the forests, and in her spare time, if any, reared children in plenty. It is thus seen that the woman of those days had a comparatively "easy" time of it, and I recommend this paragraph to all men to be read to their wives once a day. But don't say where they got it from.

Bags of flour from the miller awaiting conversion into bread.

The leavening of bread was known in the old Biblical days, for we read that Lot baked unleavened bread when he made a feast, and the Jews were ordered to eat unleavened bread at Passover. If there had been no leavened bread, there would have been no need for the order.

Unleavened bread was simply a mixture of flour and water, and the biscuits eaten by the Jews were called Matzoths. It is rather an unpalatable biscuit by our standards.

LEAVENING

Leavening of bread was carried out by keeping a piece of old dough handy and using this in the manufacture of a new one. The old dough contained the necessary bacteria for fermentation, although this was not known by people of those days.

Later on, when yeast was discovered, it was found that this substance did the job of leavening much better than a piece of old dough, and this process is used at the present time.

Yeast consists of small cells which,

OF OUR MOST ANCIENT FOODSTUFFS

being alive, multiply with great rapidity. They have the power of causing fermentation by converting starch (contained within the flour) into sugar, and the sugar into alcohol (a well-known beverage) and finally into carbon dioxide or carbonic acid gas (seen in lemonade and ginger beer and very plentiful during election campaigns).

The alcohol, fortunately or unfortunately, according to the point of view, evaporates during the baking process, so that bread is non intoxicating. But the carbonic acid gas forms bubbles in the dough, and causes the bread to rise and become light and spongy. The dough forming the walls of the bubbles solidifies during the baking and thus forms a mass consisting of millions of permanent bubbles, the mass is much greater in volume than the original dough and we imagine that we have received a lot for our money.

CARBONIC GAS

Carbonic acid gas is also formed in dough mixtures such as sponge cakes, by the addition of baking powder or self-raising flour. These powders contain chemicals which, on moistening, release large quantities of carbonic acid gas, and thus have the same effect as yeast.

In early days, bread was considered to be so important to the people that rigid supervision was maintained over the baker. Bakers were divided into White Bakers and Brown Bakers, according to the type of bread baked.

Supervision in the main was confined to the weight of the loaf and adulteration, for even in those days bakers soon learned to weigh his thumb in with the dough on the scales, or put into the dough that which was not intended. In the Middle Ages, a baker who was found out was better off "had he not lived at all," for his guild, or the boss of the municipality, ordered most harsh and cruel measures as a lesson.

ADULTERATION

A common punishment was the pillory or a whipping, and even "nailing the culprit by his ears to the doorpost of his shop" was resorted to in extreme cases. Should a famine be in progress, and the baker be found out in some irregularity, the mob very often dealt out a "just" punishment by lynching. "Them were the days."

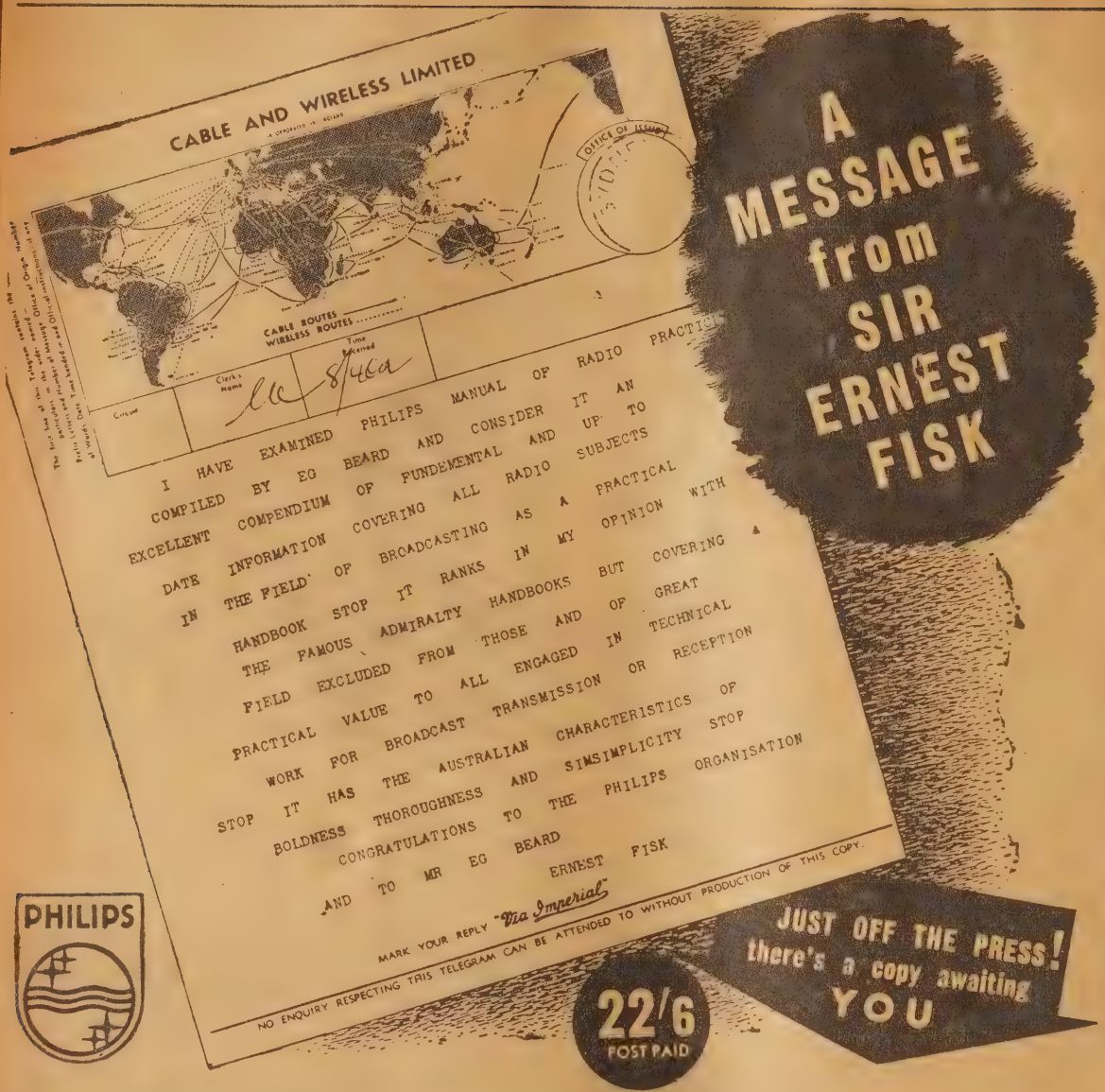
Adulteration of bread in those times took the form of the addition of such substances as alum. Bakers at times were even accused of adding chalk, lime, whiting and ground bones. Whether the latter adulterants were really used has not been proved, but it is certain that alum was used, as the addition of this chemical wrought changes in the texture of the bread which made it more attractive to the eye and more profitable to the baker. It increased the size of the loaf, whitened the bread, and gave a finer texture.

The gentleman with the critical expression is judging bread exhibits for quality and texture.

Now it is interesting to note that the necessity for supervision of bread manufacture only came about with the introduction of white bread, and the subsequent craze for this by the eating public. It was this that got the bakers into so much trouble. Competition, and the demand for white bread forced the bakers to try to make bread which was whiter than his competitor's, and, of course, what can be whiter than whiting, or chalk, or ground bones.

Although the idea of putting ground bones into bread may sound repugnant to us, it would perhaps have been better for the people if such a measure had been adopted, for bone meal contains elements which are readily assimilated by the body, namely phosphorus and calcium. In any case,

A pile of bread loaves straight from the oven.



THAT Sir Ernest Fisk, one of the greatest names in radio, should pay such high tribute to the Philips Manual of Radio Practice as to rate it with the Admiralty Handbooks is a clear indication of the book's value to all interested in radio. Fully bound, the Manual's 496 pages include 250 diagrams, 400 formulae, 105 charts and tables, and 122 valve curves. Compiled by E. G. Beard, M.I.R.E. (Aust.), Philips Manual of Radio Practice is virtually a radio library under one cover and a "must-have" for every serviceman, engineer, amateur, experimenter and student.

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people in those days made a habit of chewing bones at their meals, yet the very same bone ground up and added to bread constituted a crime beyond forgiveness.

The introduction of white bread in addition to placing temptation in the way of the baker, undermined the health of the people, for white bread is made from flour which is divested of its bran and the germ in the centre of the grain.

BLACK BREAD

When we read of the poor people in European countries living on black bread, it is no indication that they are any the less healthful for it. Black bread is truly wholemeal containing all the grain.

There was an idea prevailing in olden times that brown bread was not healthful. An author of the 16th century thus wrote: "Brown bread which the people eateth in too large quantyte having moch branne and other noxious elements, fylleth the belly with excrements and shortly descendeth from the stomache."

Of course in those days, people knew nothing of vitamins. It is only in comparatively recent years that we have become plagued by such things. Nevertheless we must abide by the significance of such discoveries, and the necessity of vitamins to health is now accepted by everyone.

VITAMIN B1

It so happens that a vitamin called thiamine, or Vitamin B1, is very necessary to health, and the richest source of thiamine is the germ of the wheat grain in the centre. It is also found in fairly large amounts in bran. Thus it is that white flour contains almost none of this important vitamin, for the germ and the bran of the wheat grain are removed during the milling process.

Whilst the effects of this deficiency of thiamine is not so greatly felt by us, it has had a terrible effect on the populations of China, Japan, and most countries of the East whose populations live almost exclusively on a polished rice diet. The craze for white rice has also penetrated into these countries, and as white or polished rice is brown rice minus its outer covering, &c., there is also a deficiency of thiamine.

Fortunately for us we vary our diet with many foods which contain thiamine. The vitamin is found in sufficient quantities in such foods as seeds and nuts, egg yolk, beans, peas, raw peanuts, rye, whole wheat, lean meat, pork, asparagus, broccoli, prunes, turnip greens, pineapple, and others.

BERI-BERI

Deficiency of thiamine in the diet of Eastern people who subsisted almost wholly on polished rice, led to hundreds of thousands of people becoming afflicted with a disease called beri-beri. The disease takes the form of a loss of appetite, weakness, loss of intestinal functions, fall in blood pressure, swellings, low body temperature, and finally degeneration of all nerves and muscles and death.

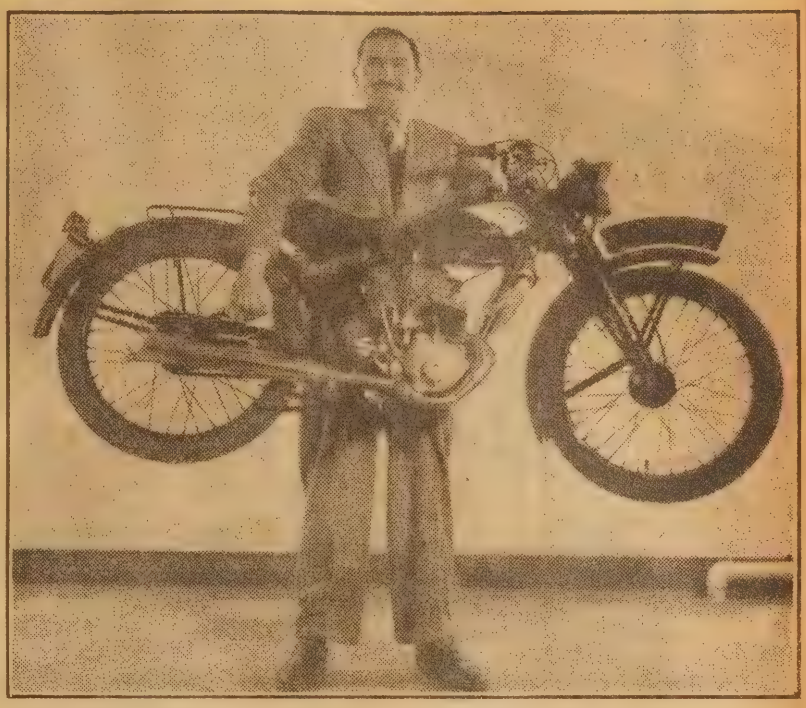
With the discovery of thiamine, science has almost caused beri-beri to disappear wherever science and medicine can penetrate. The first extract of the vitamin was made from rice polishings, but it is now being made synthetically.

Although thiamine is contained in the other foods mentioned, it is largely a matter of luck or instinct that enables us to keep free of the disabilities attendant on a deficiency of the vitamins.

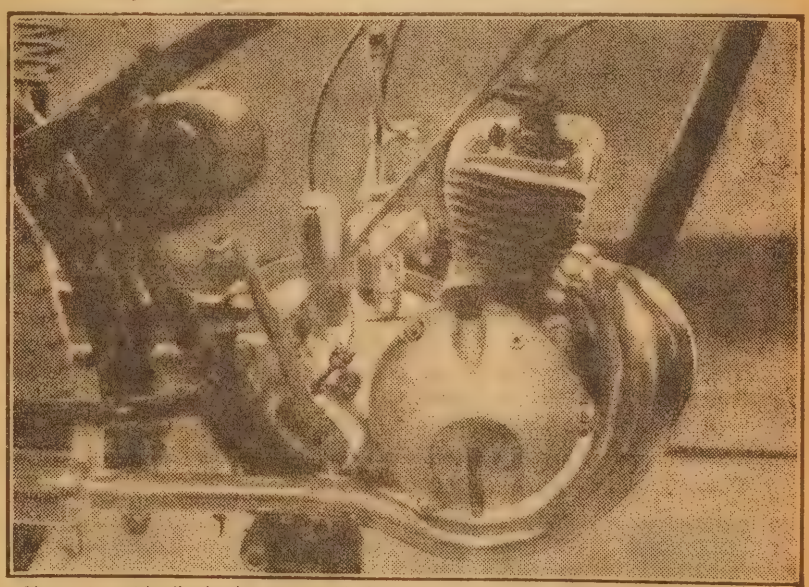
There is always a danger of a deficiency taking place notwithstanding the consumption of other foods for the

(Continued on Page 76)

WORLD'S LIGHTEST MOTOR BIKE



The lightest motor-cycle in the world, which can easily be lifted by a man and carried, has been produced by a British engineering concern. It was exhibited simultaneously at the British Industries Fair in London (Earls Court and Olympia) and Birmingham (Castle Bromwich) recently. Although weighing only 135 pounds the machine has three speeds and will carry the average man at between 40-45 miles per hour. The above picture shows the neat design very much on the lines of a top-weight machine. Petrol consumption is between 100-120 miles per gallon and oil consumption between 2400-2800. Petrol tank capacity is 1½ gallons.



The unit, with flywheel-magneto, lighting-generator and gearbox integral, is of 54 mm. bore and 55 mm. stroke (2 stroke).

Leaders

IN THE SPEAKER FIELD

ROLA

ROLA 8K: For consoles and table model receivers. Lighter and more compact than standard 8" speakers the 8K does not dissipate heat owing to elimination of the field coil by use of an Anisotropic Alnico magnet.

ROLA 3C: Australia's smallest loud speaker. Admirably suited for use in small portables and compact communication systems. A triumph in speaker design achieved by the use of Anisotropic Alnico.

ROLA 5C: A 5" 12-oz. speaker ideally suited for A/C, and AC-DC midget receivers, and also finds useful application in vibrator and battery operated sets.

ROLA 6H: This 6" speaker is expressly designed for larger and better quality mantel receivers. Used with a chilase choke (Rola 6/60) it replaces electro-dynamic speakers in A/C operated receivers.

Limited supplies of ROLA speakers are now reaching the trade, but do not be disappointed if the speaker you want is not immediately available.

ROLA

LOUD SPEAKERS with ANISOTROPIC ALNICO

GEO. BROWN & CO. PTY. LTD.,
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BESSEMER STEEL-MAKING PROCESS

STEEL is the strongest and most lasting material of the iron-steel group. Cast iron, which may contain appreciable quantities of ingredients such as sulphur, phosphorus and carbon, is hard but brittle. Wrought iron, made by a process of puddling or working molten iron in a special type of furnace, is workable and enduring but possesses none of the hardness of cast iron nor the strength and resilience of steel.

In steel itself there is an absence of impurities such as sulphur, silicon and phosphorus. Its character is largely derived from combination of carbon with the iron. Steel is easily worked and can be tempered and hardened.

EARLY MANUFACTURE

Steel was once made by packing bars of wrought iron on to powdered charcoal, sealing them in a clay chest, keeping the whole red hot in a furnace for a week or 10 days, then letting it cool very slowly . This was the "cementation process"; its product was "spring steel" or "shear steel." About 200 years ago a method of producing an improved steel was discovered. It consisted of melting cemented steel in a clay crucible.

In 1854 an Englishman, Henry Bessemer, started experimenting with steel production by blowing a blast of cold air through a mass of molten iron. His process, known as the Bessemer process, is still widely used.

Sketched here is a group of Bessemer converters or large pear-shaped retorts. The converters are usually set up in a circle, as shown.

The converter is first made red hot with burning coke, after which the coke is emptied out and the molten iron poured in, together with carbon and other substances in definite quantities, according to the kind of steel to be made. The converter in the upper left-hand corner is being charged with molten iron from a huge ladle.

THE CONVERTER

The next step is seen in the converter sketched in the lower left-hand corner. A jet of compressed cold air forced up through the base of the converter releases gases which ignite, so that the temperature of the whole mass is raised still more.

Sulphur, carbon, silicon and manganese are oxidised and burnt out, vanishing through the top of the converter in a jet of flame and sparks.

As the process gets under way the hissing of the flame increases to a roar. The process continues for about 20 minutes, after which the flame snuffs out suddenly. The molten steel is now ready for pouring out into ladles, but so thoroughly has the air done its work that most of the carbon has been burnt away as well.

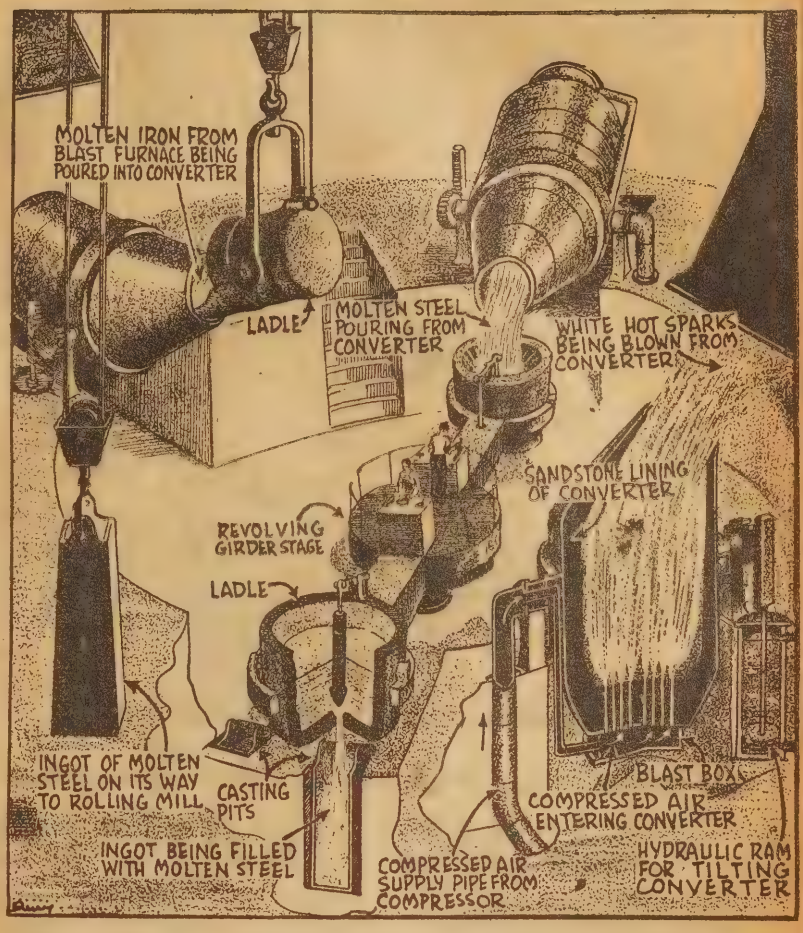
In order to make really hard steels more carbon is now added, with some manganese, which causes the carbon to combine with the iron.

The molten steel is now ready for pouring out into a ladle. The converter is tipped (as seen in the converter at centre right), and the steel flows into a ladle brought into position by a revolving stage.

The ladle is then swung round directly over one of the casting pits (lower left), where the stopper is raised and the molten steel runs into an ingot, which is then carried away to the rolling mill.

In Bessemer's time the presence of phosphorus in the pig-iron was inimical to the production of a satisfactory steel.

But since his day phosphorus has been conquered without radically altering the design of the converter. The conversion of phosphorus-bearing iron takes place in a converter lined with a basic dolomite. These types are known as basic converters, in contrast to the acid converter of Bessemer's design.



Steel is the core of the modern world, with transport and communication and every great building depending on its use. In peace and war, a mighty river of steel flows from tens of thousands of blast furnaces, to be absorbed in innumerable uses by millions of tons.

SILICON, most plentiful metallic element in the earth's crust, is an unexploited field which some researchers expect to become highly important in the future. Resins, varnishes and oils are already made from it. Silicon is six times as abundant as iron.

★ ★ ★

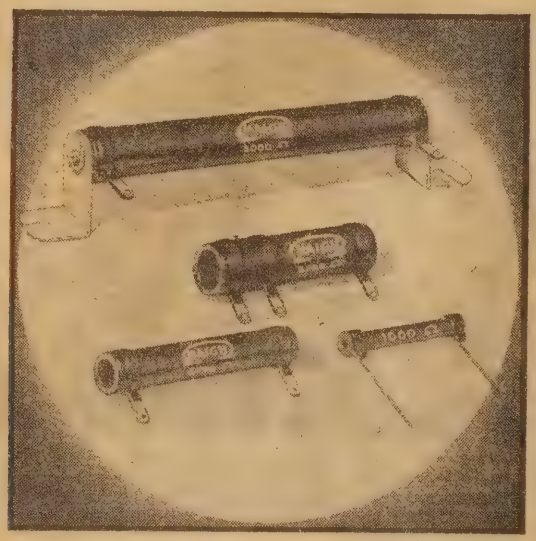
If Abraham Lincoln's father had used sawed lumber instead of logs, the same amount of timber in the cabin Abe was born in could have built four modern homes.

★ ★ ★

Over half America's supply of electric power is produced by coal-burning equipment.

HAIGH

POWER WIRE WOUND RESISTORS



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AUDIO TRANSFORMERS

BY FERGUSON'S — STANDARD RANGE TYPES

Type:	Primary:	Secondary:	Rating:
OP-1	5000 ohms & 2500 ohms S.E.	12.5 ohms, tpd. 8.0 ohms tpd. 2.3 ohms Voice Coil	10W
OP-1-A	5000 ohms & 2500 ohms S.E.	500 ohms LINE	10W
OP-5	5000 ohms, 6600 ohms, 10,000 ohms P-P:	tpd. 8.0 ohms tpd. 2.3 ohms	15W
OP-9	5000 ohms, 6600 ohms, 10,000 ohms P-P:	500 ohms, 250 ohms, 125 ohms) 1, 2 or 4	15W
OP-18	3800 ohms P-P	" " ") Speakers	60W
OP-19-A	5000 ohms P-P	12.5 ohms, tpd. 8.0 ohms tpd. 2.3 ohms Voice Coil	HI-FI. 15W
OP-8-M	10,000 ohms P-P	500 LINE 10 TAPPINGS	15W
OP-15-M	6600 ohms P-P	" "	32W
IP-1	6J7G TRIODE	P.P A1, AB1, GRIDS	
IP-2	6V6G TRIODE	P.P AB2, GRIDS	
U-1	(30,000 ohms, 20,000 ohms, 14,000 ohms) (10,000 ohms, 7,000 ohms, 5,000 ohms) (2,500 ohms P-P or S-E)	2.3 ohms, VOICE COIL	10W
M-50	3,800 ohms, 6600 ohms P-P 8,000 ohms MODULATION	10,000 ohms, 7,500 ohms 6,500 ohms, 5,500 ohms 4,500 ohms, 3,500 ohms	50W

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NEWS AND VIEWS OF THE MONTH

Radio 'Nationalisation'

IN several editorials during recent months, we have had something to say about the trends of Australian broadcasting. These centred round first of all the future of the ABC, the desirability or otherwise of its "going commercial," the wisdom of its independent news service and the cost thereof, the position of the "ABC Weekly," and finally, the possibility of the Government taking action to nationalise all Australian broadcasting, both National and commercial.

When we wrote those editorials, more than one individual expressed the opinion that some of our ideas, particularly the suggestion concerning complete nationalisation, were a bit far-fetched. They thought that possibly our judgment was influenced by too close observation of the subject.

As we go to press it is interesting to read that the reports of the Standing Committee on Broadcasting raised every one of the matters mentioned above, including a recommendation for a debate on controlling the "B" class stations to the point of nationalisation.

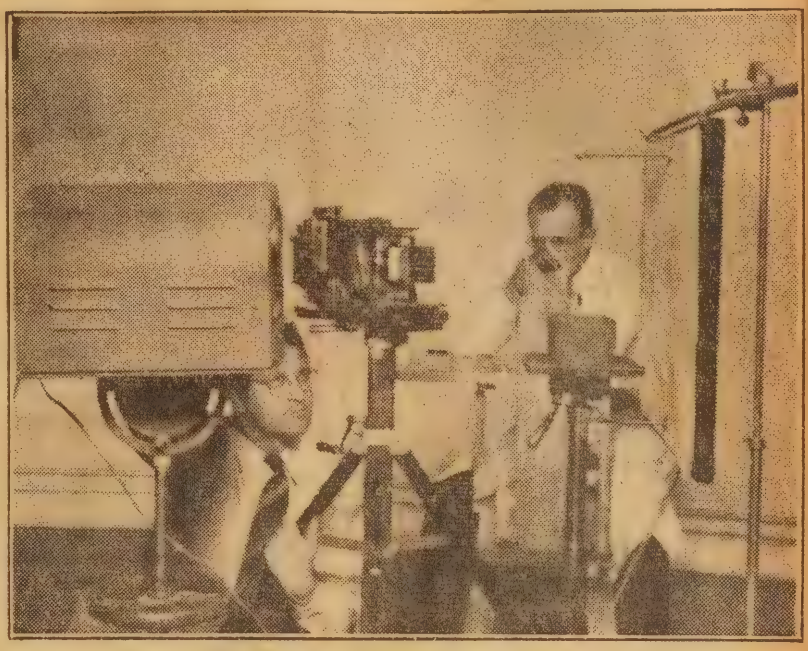
Will we ever wake up to the dangers of what is going on? Apart from any political views or colors, it is a negation of every principle governing freedom of speech for any Government to have the complete Australian broadcasting system under its control, or even part of it.

It ties itself in principle to the statements we have heard from responsible Ministers that action should be taken to control what newspapers should or should not say concerning Government matters.

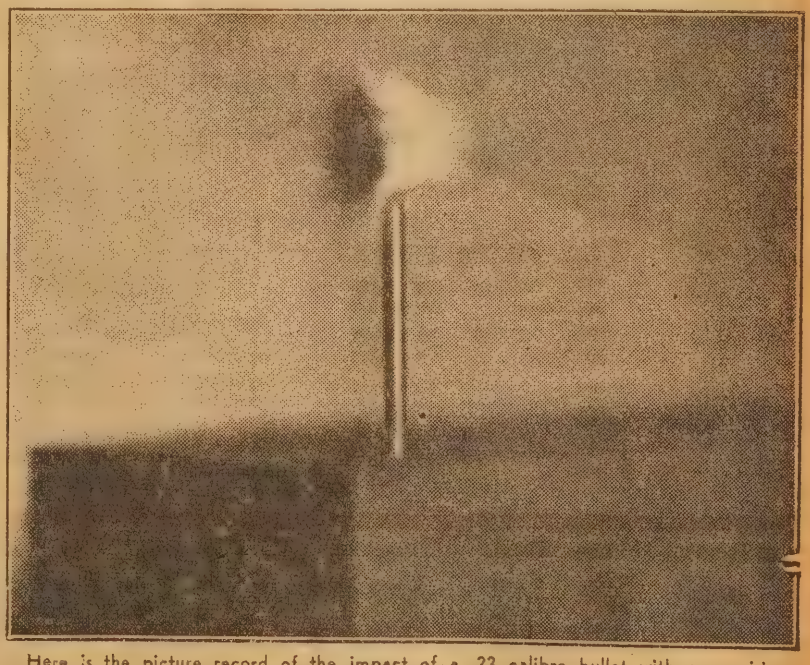
With the example fresh in our minds of just where these ideas might lead, how can the Australian public view all this without serious alarm?

Let us refer once again to the "straws which the wind has blown" about all this. If the Government is sincere in its concern about the financial stability of the ABC let it refer to the activities of the commercial stations, of whose financial position there can be no such alarm. Is it not rather that the alleged unsatisfactory position of the ABC is being used as a convenient focal point round which this desire to regiment our radio is to be turned?

We can only hope that the public will react unmistakably to any proposals which will bring about such regimentation. We unfortunately cannot have any illusions about the manner in which it would be employed. Democracy is not democracy if we are not free to say what we think.



AN ASPIRIN FOR BALLISTICIANS—Ballistics experts, not chemists or medical authorities, provide the latest information on how fast an aspirin tablet will dissolve. The time .00001 1ths of a second, was determined in a laboratory of Western-Winchester. To photograph the impact of a bullet with an aspirin, ballisticians mounted a tablet on a tiny rest, aimed a rifle at it and, synchronising an ultra-high speed photolight, made a series of pictures with a three-millionths of a second exposure. It took the .22 calibre bullet (muzzle velocity—1400 feet per second) .00001 1ths of a second to "dissolve," or to shatter into a puff of dust, the aspirin tablet which measured three-sixteenths of an inch from front to back. Robert Lemons, ballistics technician, will fire the gun in darkness. As the bullet snips a tiny copper wire it actuates the photolight.



Here is the picture record of the impact of a .22 calibre bullet with an aspirin. The bullet, streaking at 1400 feet per second, has severed the copper wire (left, centre) and now is almost hidden in the dust of the aspirin tablet.

Eliminate Background Noises from your Radio ....

R.C.S

LINE FILTER

TYPE LF 20

PRICE 21/-

● **The R.C.S. Line Filter is specially designed and constructed to eliminate all noises which occur by reason of feed-back from power mains . . . electric motors . . . refrigerators . . . elevators . . . sub-stations . . . high tension wires . . . irons . . . and jugs! Easy to install — it connects between the radio and power point.**

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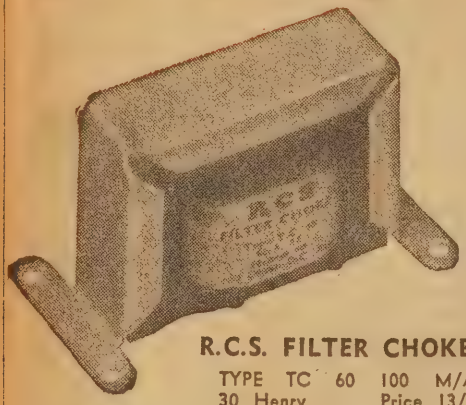


R.C.S. FILTER CHOKES

TYPE TC 60 100 M/A
30 Henry ____ Price 13/6

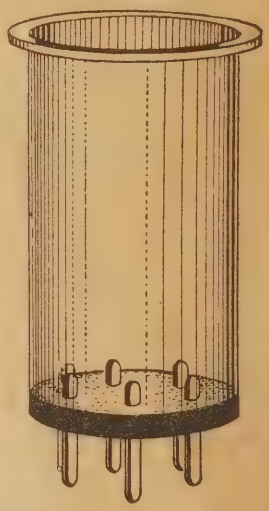
TYPE TC 65 50 M/A
30 Henry ____ Price 13/6

Wound on moulded Trolitul formers R.C.S. Filter Chokes have a resistance of 250 ohms. and 400 ohms. respectively and will carry the M/AS without overheating size 2¾in. x 2¼in. x 1¾in.

LINE FILTER COILS TYPE RF15 PRICE 11/6

This choke is the same as used in the R.C.S. Line Filter and has a carrying capacity of 1AMP. Wound on 1¼in. former with mounting lugs attached.

6 PIN PLUG-IN COIL FORMERS



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F.M. Opinion

IT is highly interesting to note the reactions of well-informed Australians to F.M. and Television abroad. During the last few weeks, at least two such men have returned from overseas tours, men who were able to penetrate well into the secrets of the industry both in England and America.

Concerning television, the general opinion seems to be that satisfactory technical services are possible in both countries, but in America at least, they are unable to make up their minds about standards for black and white television, or about the spanner which color television has thrown into the works.

Somehow we still think all the systems so far put forward are still too complicated and possess too many disadvantages to represent the final answer. At the moment, cathode ray tube technique and scanning discs play a very large part in these systems. Some day, some ingenious individual will come forward with a simpler scheme which will render both these obsolete. At least it appears pretty certain that really inexpensive, high quality television in full color will have to wait until someone does.

Concerning F.M., one man reports that it has proved the logical method of broadcast transmission destined inevitably to replace the older system some time in the future. Another says that he has found strong opinion at least in America that A.M. can still equal F.M. results and do the job better. At least we agree he is right in saying that at present, we are not making the most of A.M. either in transmission quality or in the use of power.

All seem agreed, however, that our policy in Australia should continue to be one of hastening slowly. In most cases, our returned technicians prefer not to be drawn into any expressions of opinion on the use of F.M. here. It is encouraging to see the application of realism in thinking which even the daily Press has adopted of recent months about the whole subject. Let us hope that the day of wild statements, or of well informed but over enthusiastic prophecies, has gone, when discussing Australian F.M.

Atomic Warships

THE United States plans to build warships that will go into battle with crews and instruments hidden from the enemy.

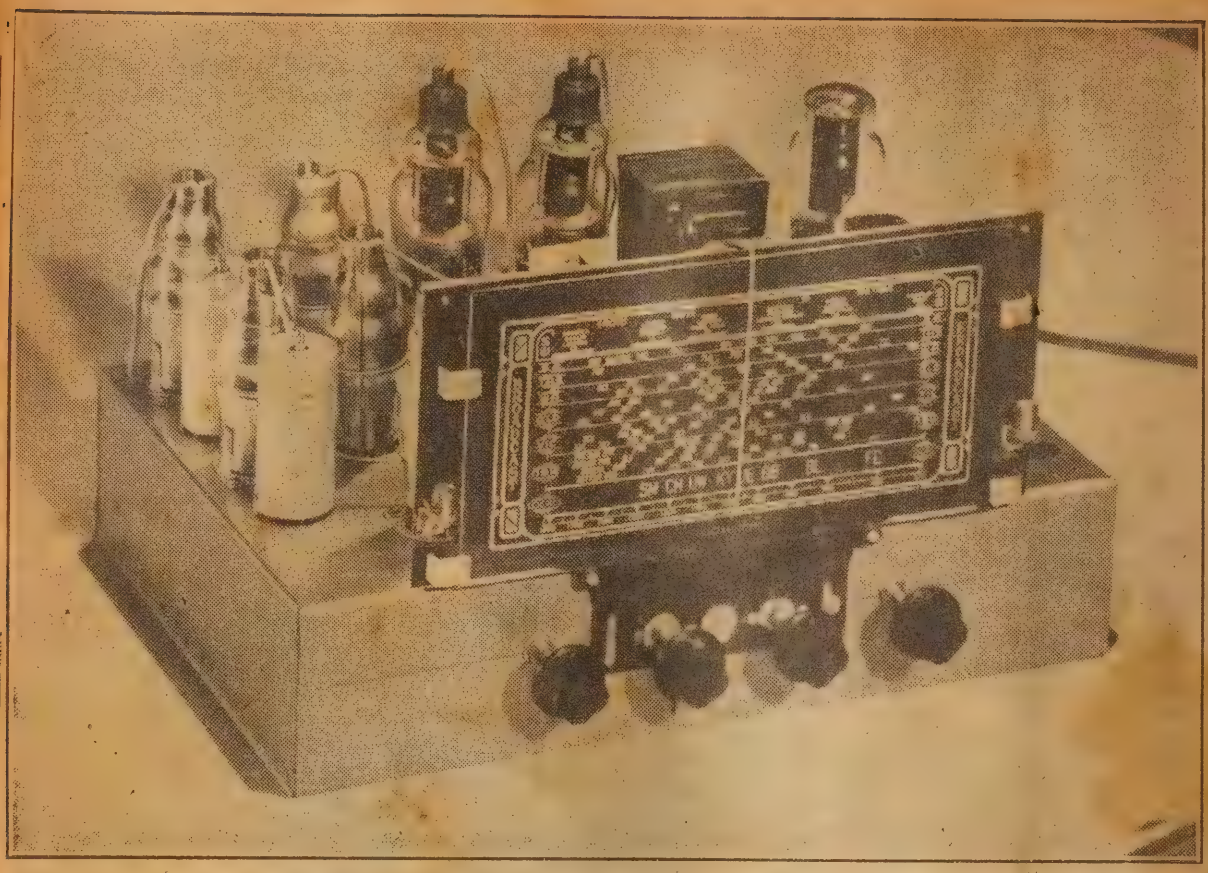
The Assistant Secretary for the Navy (Mr. John Kenny) said that new designs in warships would incorporate lessons learned in postwar tests.

These tests were at Bikini in July last year, where the two atomic bombs were exploded, and in the Antarctic.

"The future ships may have few exposed personnel and instruments, and probably no man will be in sight at battle stations," Mr. Kenny said.

"Application of the results of the atomic bomb tests at Bikini are still being studied.

"The best scientific brains in the world are working to adapt what we have learned to new types of ships."



This front view of the receiver shows that it is quite an imppressive affair. Mounted in a good cabinet it should give a general performance better than anything available at present.

1947 SENIOR RADIOGRAM

With an output of over 20 watts, this is the most powerful receiver we have ever described in "Radio & Hobbies." A pair of 807 valves in the output stage, with negative feedback and bass compensation, ensure quality reproduction at all volume levels. And its powerful tuner will bring in any signal worth listening to.

by W. N. Williams

As a constructors' magazine, we have always assumed the task of designing and describing occasional receivers more ambitious than those generally available on the commercial market. A notable example was the famous "1933 Standard" and, since then, there has been a series of "Standards," "Seniors," and "Majestics," each one embodying the new components and features which have appeared from time to time.

PARTS POSITION

War conditions and the subsequent shortage of components have curtailed our activities in this line during the past two or three years, but many requests have been coming to hand lately for a new big-set design. With the idea fresh in mind, the price of 807 valves was cut drastically to half the previous figure, and our new "Senior Radiogram" began to take shape—mentally, at least.

Not that the parts position has drastically improved of late. There are still periodic shortages of most components, and very rarely can one buy all the necessary bits and pieces at first try. But the fact remains that sets are being built, and numbered among them will soon be a lot of "1947 Senior Radiograms."

In planning our new big set, certain circuit arrangements form a more or less natural choice. While it is well to be aware of alternatives, there is not much point in departing from normal practice simply for the sake of being different.

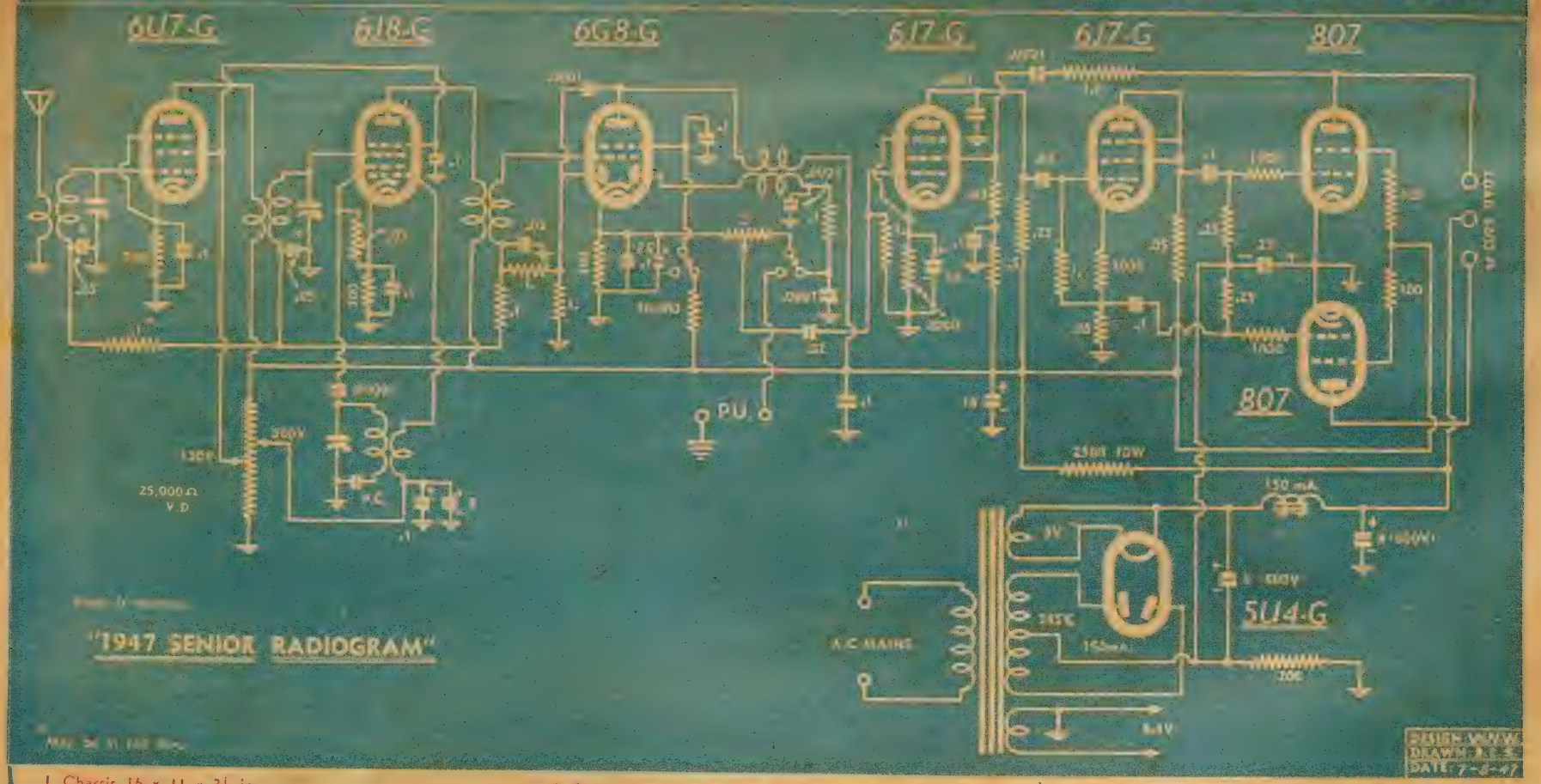
Obvious choice for the tuner seemed to be an R.F. stage, converter and combined I.F. and detector valve. Such a tuner will cope with any signal worth listening to, and has the advantage of leaving the audio amplifier section completely self-contained.

COIL KIT

We felt that the set would need to be a dual-wave job, preferably using a dual-wave coil box. Or rather, that our chassis should be capable of housing such a unit, leaving to the individual constructor the choice of unit or the possibility of wiring in separate coils and switch.

This accounts for three valves. A push-pull output system was envisaged, using type 807 valves for preference. These are available now at the same price level as ordinary output valves,

CIRCUIT DIAGRAM OF THE 1947 SENIOR RADIOGRAM



- 1 Chassis 16 x 11 x 3½ in.
- 1 Power trans. 150mA., 385v., CT 385v., 6.3v. at 3 amps., 6.3v at 4 amps., 5v. at 3 amps.
- 1 Filter choke. 150mA.
- 1 3-gang tuning condenser.
- 1 Tuning dial to suit (Efco USL 46).
- 1 Dual-wave coil kit.
- 2 455Kc iron-cored I.F. transformers.
- 5 Valve shields.
- 1 D.P.D.T. switch.
- 1 Output transformer (see text).

RESISTORS

2 1.5meg., 4 1meg., 3 .25meg., 3 .1meg., 1 .075meg., 3 .05meg., 1 .025meg., 1 25,000ohm voltage divider, 1 .5meg. potentiometer, 1 5000ohm, 2 250ohm 20W W.W., 1 1000ohm W.W., 2 150ohm, 3 300ohm W.W., 1 200ohm 20W W.W., 2 100ohm.

CONDENSERS

2 25mfd. 40 P.V., 1 10mfd. 40 P.V., 1 16mfd. 525 P.V., 3 8mfd. 600 P.V., 11 .1mfd. tub., 3 .05mfd. tub., 2 .02mfd. tub., 4 .0001mfd. mica, 1 .00005mfd. mica.

SOCKETS 6 Octal, 3 5-pin.

VALVES

1 6U7-G, 1 6J8-G, 1 6G8-G, 2 6J7-G, 2 807, 1 5U4-G.

SPEAKER 12 inch Permagnetic type, heavy duty.

SUNDRIES

4 Knobs, 4 terminals, hook-up wire, shielded wire, nuts and bolts, solder tags, 5 small grid clips, 2 large grid clips insulated power flex, 1 extension shaft, resistor strips, spaghetti, 2 dial lamps.

but are capable of very much higher power output. With large valves of this nature, the push-pull system has a particular advantage in regard to filtering, since the hum components in the plate and screen circuits tend to cancel rather than to add. And filtering is something of a problem in these days, when chokes and condensers are at a premium.

The push-pull signal voltages can be obtained from a variety of circuit arrangements, and these were considered on their merits. Ultimately, we came back to the well-proved arrangement using a pentode voltage amplifier, and triode phase splitter, resistance coupled to the output valves. Some very careful measurements were carried out on this circuit recently by the A.W. Valve Company, proving the accuracy of the matching and, incidentally, demonstrating some reasons why doubts have sometimes been cast on this circuit.

EIGHT VALVES

The audio amplifier adds four more valves and, counting in the rectifier, this adds up to eight all told.

Not wishing to stint things, we planned for a 150 milliamp power transformer and choke, with one of the larger rectifier valves. On this basis, the voltages work out conveniently for class AB1 operation of the 807 valves, providing a power output of better than 20 watts. This, in turn, calls for a suitable output transformer, which is preferably mounted on the chassis.

Knowing the general requirements, it was obvious that the existing "Senior Radiogram" chassis could not easily be adapted for the new version. That chassis was cut for a coil unit, which is now out of production, and at least one of the newer coil units has larger overall dimensions. Dials have been redesigned, and the laminations used for some of the 125-150 milliamp power transformers are of larger area.

In the light of this, we designed a somewhat larger chassis to accommodate the new components as well as the output transformer. The new chassis can still be used for the earlier design, so that it can be regarded as superseding the original one.

LAYOUT

One immediate problem is that of grouping the gang condenser, tuning dial and coil box in a convenient manner. It is natural to use a big straight-line dial with this type of set, and these invariably have a spinner on the same shaft as the tuning knob. The coil boxes have a centrally placed switch spindle, and, short of mounting the gang condenser on very lofty brackets above the chassis, the only possible alternative is to displace the tuning knob and coil box to either side of centre, pushing the coil box back far enough to clear the spinner.

If a large box has to be provided for, it presents a difficulty in placing the R.F. and converter valves to avoid unduly long leads The layout is largely dependent on these factors and, until some standardised layout procedure is adopted by the major component manufacturers, there is very little that the individual designer can do about it.

We have seen samples of two coil boxes with R.F. stage now on the market. The larger one of these was used in the chassis, on the assumption that there would be ample room for the smaller one. Individual readers may have other or older coil boxes on hand, and each one of these has to be treated on its merits, as far as layout and mounting arrangements are concerned. A chassis cut to suit them all would begin to look like a Meccano set.

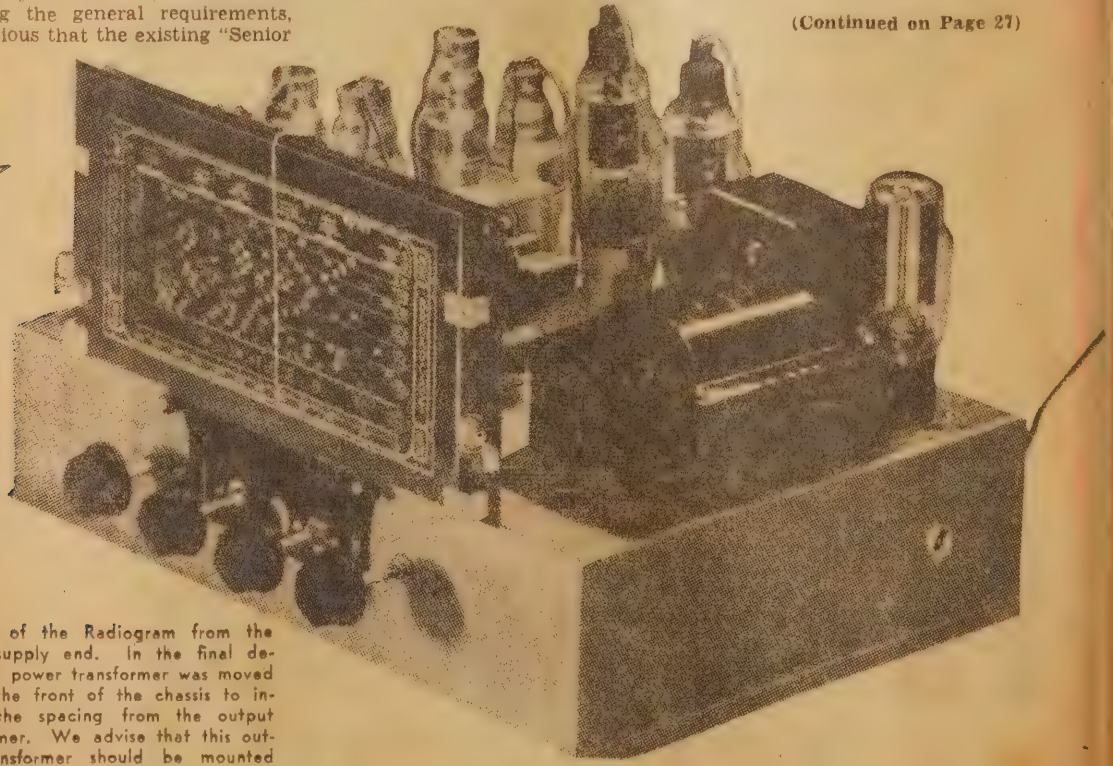
The new chassis measures 16in. x 11in. x 3½in., with a cut-out to accommodate the dial mechanism and the offset tuning spindle. An extension spindle has to be added to the coil box, and this protrudes through a hole in the tuning dial plate. Volume control and pickup switch are symmetrically placed to either side of these controls.

GANG MOUNTING

The tuning gang is centrally placed, with rather longish grid leads running across to the R.F. amplifier and converter valves. As previously explained, this cannot well be avoided. The two I.F. transformers and the 6G8-G amplifier group closely behind the converter valve, leaving the audio channel to progress in order along the rear edge of the chassis.

The 6J7-G audio amplifier is in the rear left hand corner of the chassis, with the phase splitter and the two

(Continued on Page 27)



A view of the Radiogram from the power supply end. In the final design, the power transformer was moved nearer the front of the chassis to increase the spacing from the output transformer. We advise that this output transformer should be mounted on the chassis. Although not essential, a special 25-watt job is a good investment.

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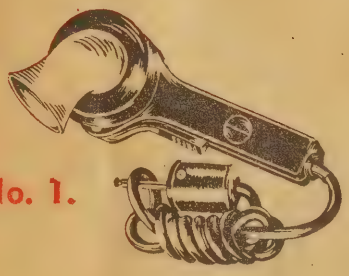

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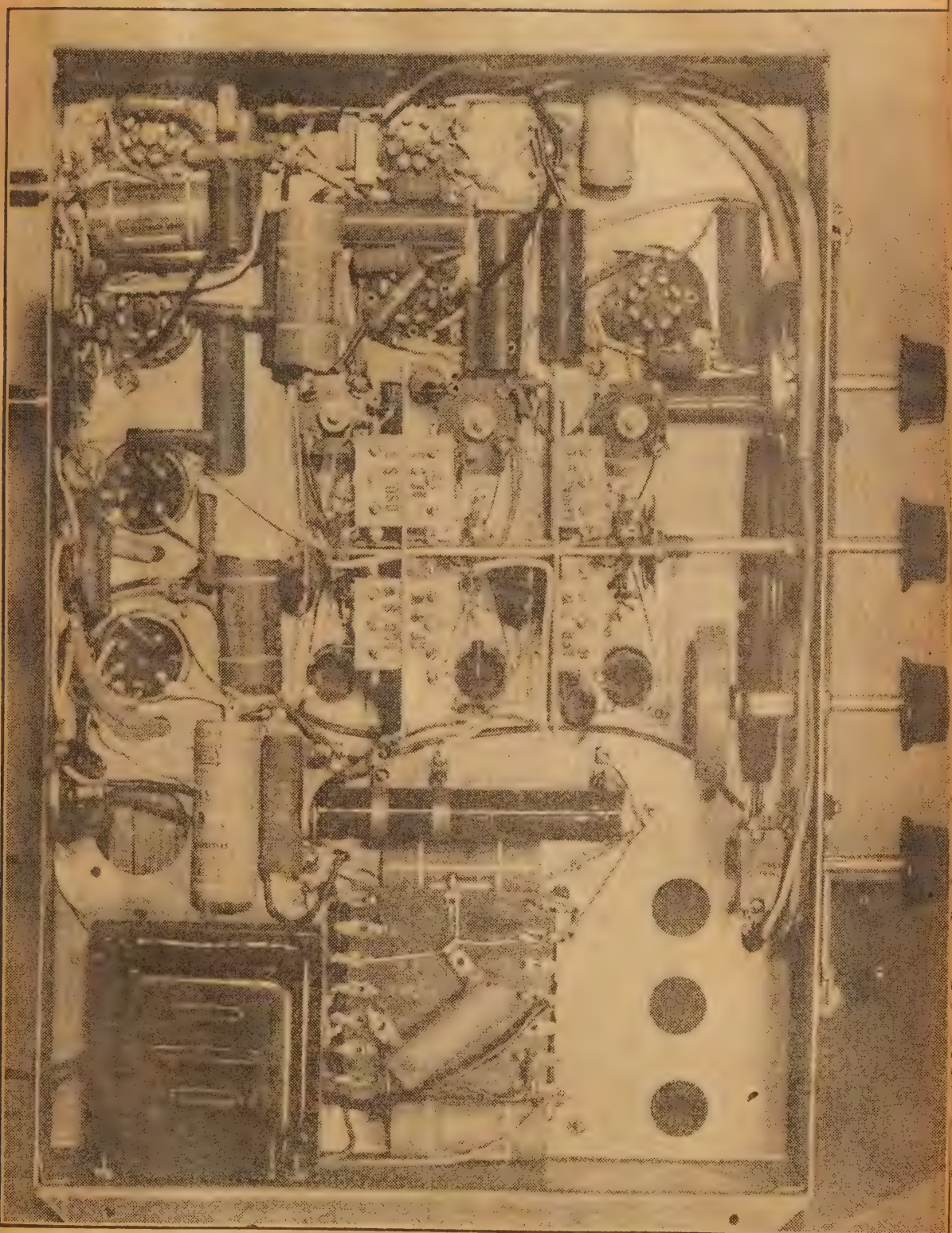
UNDER-CHASSIS PHOTOGRAPH OF THE RADIOGRAM



This photograph is in many ways more valuable than a wiring diagram as it shows the exact position of all component parts under the chassis. Note once more that the chassis you buy will show the transformer nearer to the front of the chassis. The 10 mfd. electrolytic on the cathode of the 6C8G was not in position when the photograph was taken but it can be installed either at the valve socket or soldered to the appropriate lug on the volume control. If time and space allows, we may be able to prepare a complete wiring diagram for publication in the next issue. Be sure to use 600 volt electrolytic condensers on either side of the filter choke.

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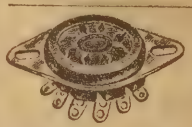

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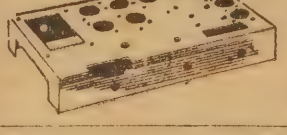

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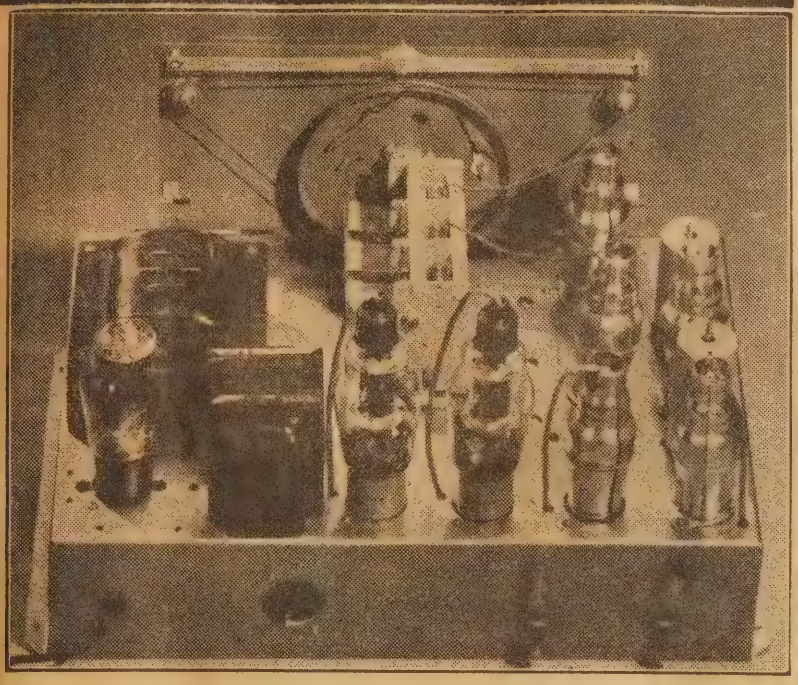
A REAR CHASSIS VIEW OF THE SET



A rear view of the set shows the general chassis layout. The transformer has now been moved forward and speaker sockets, aerial, earth and pick-up terminals are shown.

807 valves alongside. Then comes the output transformer, and finally the rectifier valve. The power transformer is in front of the rectifier, and the filter choke is mounted under the chassis below the rectifier socket.

Checking through the circuit diagram, the general arrangement of the tuner is quite conventional. A 6U7-G is used as R.F. amplifier, followed by a 6J8-G converter valve. A 6G8-G serves as the I.F. amplifier, the diodes being used for detection and A.V.C.

We considered the use of higher gain or single-ended type valves for these stages. However, higher gain is hardly necessary in a tuner of this type, and only increases the chance of instability. And the single-ended types are very slow in coming forward.

SELF BIAS

Self bias is used on the three stages in the tuner section, contrary to our practice in a few recent receivers. The chief factor in this arrangement is that the short-wave R.F. coil in many coil boxes is often earthed direct, making it impossible to apply a negative bias to the grid without interfering with the wiring of the box. To simplify matters, cathode bias was used for all tuner stages, A.V.C. being applied to all three on the broadcast band, and to the R.F. and I.F. amplifier valves on the short-wave band.

In the coil box selected for the original receiver, the A.V.C. bypass condensers and one resistor are included in the wiring of the box, thus ensuring correct return circuits for the coils. It is unnecessary to duplicate these parts externally, so that the wiring of the coil box should be checked to see which of the parts, if any, are already included.

COIL CONNECTIONS

It is impracticable to provide diagrams for all types of coil units which readers are likely to employ, but most of the installation problems should yield to a little careful thought.

From the aerial section of the box, one lead will go to the aerial coil and another up through the chassis to the front stator plates of the tuning gang. A lead from the top of the tuning gang goes across to the grid cap of the R.F amplifier valve. There will probably be an earth return for the aerial section, provided either by a short length of copper braid or an earth lead for connection to the gang wiper contacts. Finally, there will be the A.V.C. lead to the R.F. amplifier valve, involving a 0.1 meg. resistor and a .05 mfd. condenser. These components may be already installed in the box and connected through to the A.V.C. feed point for the converter valve.

R.F. SECTION

From the centre, or R.F. section of the box there will be a lead to the plate of the R.F. amplifier valve, and a connection to B-plus. Another lead to the gang stator plates and probably an earth connection. Finally, there will be a connection to the A.V.C line

From the oscillator section of the box, there will be connections to the oscillator grid and plate, to the oscil-

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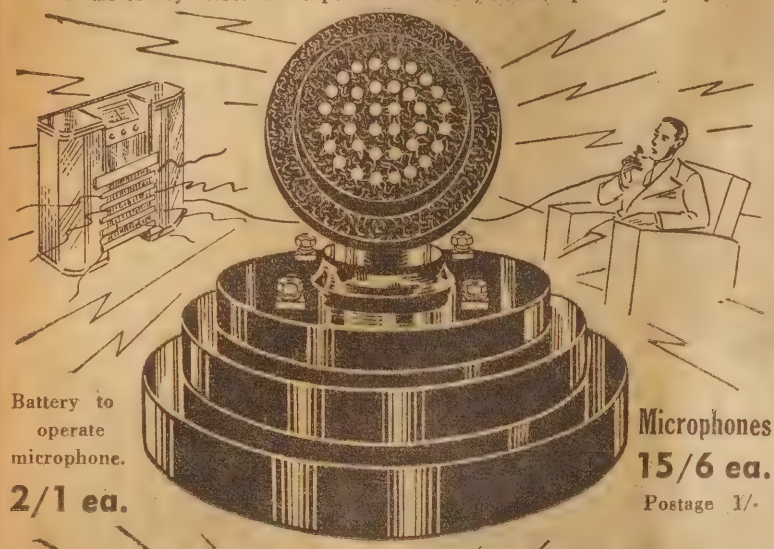

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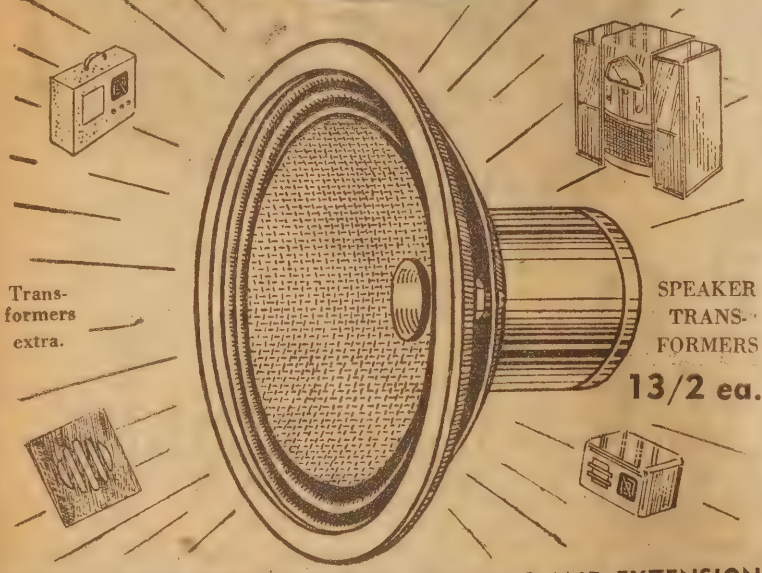

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NEW STANDARD RADIO

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lator B-plus supply, and to the oscillator tuning gang.

Identify all these leads from the leaflet accompanying your coil box, pick them out in the circuit diagram and wire them up accordingly.

The wiring of the I.F. stage is quite conventional, but there are plenty of leads and connections to be installed around the pickup switch and volume control. The two .0001 mfd. condensers and the 0.1 meg. resistor for the diode circuit are installed near the base of the second I.F. transformer, and a long shielded lead is taken around to the pickup switch.

With the switch in the "Radio" position, the circuit is completed through to the audio volume control, via another shielded lead. The signal passes from the potentiometer tapping to the grid of the 6J7-G amplifier, and this lead must also be shielded. Incidentally, in the "Radio" position, the screen voltage is applied to the 6G8-G I.F. amplifier, the screen circuit being opened when the receiver is used for gramophone reproduction. Note that there are two cathode bypass condensers on the 6G8-G, a 0.1 and a 25 mfd. electrolytic.

PHASE SPLITTER

The "hot" lead from the pickup terminals through to the pickup switch must be shielded to prevent instability and hum pickup. Care is necessary when installing these shielded leads to prevent the metal braiding shorting against other circuit points. In fact, we slipped spaghetti tubing over sections of the braiding where such trouble was likely to occur.

The 6J7-G audio amplifier valve must be shielded, and its number 1 pin connected to chassis. The operating conditions for this valve are conventional except for the arrangement of the screen circuit. In the usual screen feedback arrangement, the screen is fed through a series resistor from the plate of the upper output valve, and a resistor of about 30,000 ohms inserted in series with the screen bypass condenser.

In this case, we have inserted a small mica condenser in series with the feedback path, supplying the B-plus voltage to the screen through a separate dropping resistor. This scheme tends to reduce the feedback at the lower frequencies, giving a degree of bass boost. This is particularly helpful when listening at moderate volume. You can adopt the idea or revert to the conventional screen feedback circuit, according to your tonal "taste."

SHIELDED LEADS

It is noteworthy that the phase splitter valve is also shielded, likewise its grid lead. These precautions are desirable in an amplifier of this type, where a lot of audio power and a couple of high gain tetrodes are parcelled up in a small space.

The output from the phase splitter feeds the two 807 output valves, which are backbiased. The grid stopper resistors at each grid pin are most important, as the amplifier is likely to

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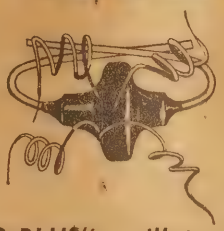

1R5 OSCILLATOR COIL

WIRE IT IN LIKE A RESISTOR

Actual size illustration of the new "Q PLUS" oscillator coil for the peanut valve 1R5—wound on the grid resistor to save space.

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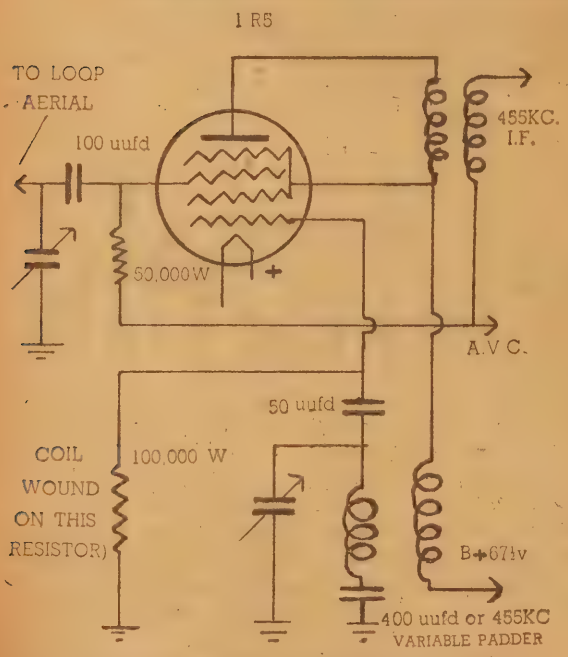

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prove quite unstable without them. They should be installed right at the grid pins to be fully effective.

Another precautionary measure against instability is the pair of screen suppressor resistors, which should likewise be connected right at the screen pins. Shield the plate leads running up to the top caps of the 807 valves and use insulated grid caps for safety. Those top caps are not grid connections!

A resistor panel along the rear wall of the chassis will accommodate neatly some of the components in the audio amplifier circuit, although the coupling condensers and grid and screen stoppers should be mounted nearer the sockets for preference. The whole idea is to arrange the components neatly, yet in a way which will ensure short leads and the least possible interaction between successive stages.

The output transformer should be mounted on the chassis to ensure obtaining short plate leads. The secondary leads are then extended as necessary, one lead being earthed.

SPEAKER TRANSFORMER

It is asking a lot of any ordinary speaker transformer to handle the output of class AB1 807 valves, and some effort and expense is worth while to obtain one more appropriate to the task. In fact, the availability of so much audio throws the speaker position into relief. Commercial output transformers are available to suit this type of set, but the position in regard to large speakers is still rather difficult.

For the power supply, we used a 385 volt, 150 milliamp power transformer, with a 5U4-G rectifier. The 5V4-G can be used instead, but, to ensure that the output voltage is not too high, resistors of about 125 ohms should be connected in series with each plate lead. The same remarks apply for the 83V type rectifier.

A conventional condenser input filter is employed, and it is more or less essential for the first two electrolytic condensers to be of the 600 volt type. The ordinary 525 P.V. type would stand a strong chance of breaking down, with tragic results for the rectifier and power transformer.

The plates of the output valves are fed from the low potential side of the choke, but, thanks to the push-pull connection, there is little chance of hum arising from this point. It does mean, however, that the applied voltage is about 350 volts, which is a recommended figure for class AB1 operation.

SCREEN RESISTOR

A heavy duty 2500 ohm resistor drops the voltage from this point to just over 250 volts for the screens of the output valves and the remaining stages. This resistor, with its associated filter condenser, provides a second "leg" in the filter network, and therefore serves a double purpose. In this form the whole power supply works out very conveniently, and the high voltage class AB1 operation limits the plate current which flows through the output transformer.

The hum level is not troublesome, but it can be reduced as necessary by the simple addition of extra filter condensers. Note that the output valves are back-biased, so that the first two filter condensers return to the high tension centre tap, not to chassis.

It should not be necessary to go into any more detail about the receiver. A big set like this, involving a considerable outlay for parts, is not intended for the raw beginner in radio—unless he has plenty of technical help at ready call. The enthusiast who requires details of every phase in the construction is far better advised to begin on a less ambitious design.

But, for the more experienced constructor, the set should present no particular difficulties. A fair number of parts have to be stowed away, but it is otherwise a straightforward job. Wire the set systematically from one section to the next, and nothing should go radically wrong.

And you need have no worries about the finished job. The alignment presents no difficulties if you follow standard procedure. If you forget what the procedure is, refer back to the July, 1946, issue, page 26.

The finished job tunes sweetly on both bands, and with ample sensitivity. Nor is there any sign of instability. The reproduction has that deep throbbing quality which bears out the power output figures, and proves the effectiveness of the bass boost circuit.

TWO-WAY TELETYPE IN AIRCRAFT

TELETYPE methods of communication can be extended to aircraft in flight by use of equipment developed by Teletype Corporation engineers and Bell Telephone Laboratories. Radiotelephone facilities provided for plane to ground communication are used without modification.

For interconnecting a teletype machine and existing press-to-talk radio telephone equipment, a converter is used. This translates the electrical conditions set up by the teletypewriter keyboard into signals suitable for transmission over the radio telephone channel. When receiving, it translates the signals from the radio channel into signals suitable for operating a teletypewriter.

The unit also automatically conditions the radio equipment for transmission when the first teletype character is sent, automatically returns the radio equipment to a receiving condition after the last teletype character is sent and lights indicator lamps to show whether the radio circuit is in the transmitting or receiving condition.

The converter unit produces an audio-frequency signal which modulates the radio transmitter continuously during teletype transmission. The frequency of the audio signal is varied back and forth between the frequencies of 1615 cycles and 1275 cycles in accordance with the teletype character being transmitted.

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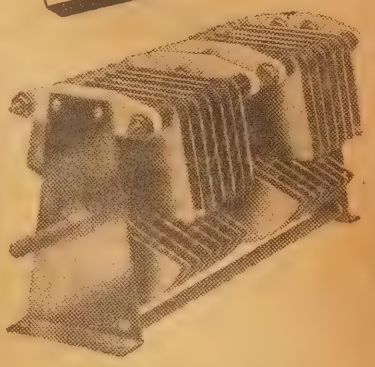

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The modulator unit described in last issue of Radio & Hobbies uses Ferguson's Audio Transformers Type 1P2 (class AB2 driver) and M50 (modulation) in its construction. Both types are in service in many Ham Stations today, giving excellent results. Listed below are the standard range types of Audio Transformers which we are now manufacturing.

STANDARD RANGE TYPES

TYPE	PRIMARY	SECONDARY	RATING
OP-1	5000 ohms & 2500 ohms S.E.	12.5 ohms tap 8 ohms & 2.3 V.C.	10W
OP-1A	5000 ohms & 2500 ohms S.E.	500 ohm Line	10W
OP-2	5000 ohms P-P	12.5 ohms tpd. 8 ohms tpd. 2.3 ohms V.C. " "	15W
OP-3	6600 ohms P-P	" " " "	15W
OP-4	10,000 ohms P-P	" " " "	15W
OP-5	5000, 6600, 10,000 ohms P-P	" " " "	15W
OP-6	5000 ohms P-P	500 ohms 250 ohms 125 ohms	15W
OP-7	6600 ohms P-P	" " "	15W
OP-8	10,000 ohms P-P	" " "	15W
OP-9	5000, 6600 10,000 ohms P-P	" " "	15W
OP-10	5000 ohms P-P	" " "	25W
OP-11	6600 ohms P-P	" " "	25W
OP-12	10,000 ohms P-P	" " "	25W
OP-13	5000, 6600, 10,000 ohms P-P	" " "	25W
OP-14	5000 ohms P-P	" " "	32W
OP-15	6600 ohms P-P	" " "	32W
OP-16	10,000 ohms P-P	" " "	32W
OP-17	5000, 6600,10,000 ohms P-P	" " "	32W
OP-18	3800 ohms P-P	" " "	60W
OP-19A	5000 ohms P-P	12.5 ohms tpd., 8 ohms tpd. 2.3 ohms V.C. Hi-Fi	15W
OP-19B	5000 ohms P-P	500 ohms, 250 ohms, 125 ohms, Hi-Fi	15W
OP-20	11,600 ohms, 8400 ohms P-P	500, 250, 166, 125 ohms	150W
OP-21	8000 ohms P-P	500, 250, 125 ohms	15W
OP-8M	10,000 ohms P-P	500 ohm line 10 tappings	15W
OP-15M	6600 ohms P-P	" " " "	32W
IP-1	6J7G triode	CLASS A1, AB1 grid driver	
IP-2	6V6G "	CLASS AB2 grid driver 807 etc.	
IP-3	(45's P-P A or AB1) (2A3's P-P A or AB1)	CLASS B GRID DRIVER. 800, 808, 809, 830B, etc. PRIM ½ sec. RATIO -- -- 2, 3, or 4	10W
U1	30,000 ohms, 20,000 ohms, 14,000 ohms 10,000 ohms, 7,000 ohms, 5,000 ohms 2,500 ohms P-P or S.E.	2.3 ohms	10W
M50	3,800 ohms, 6,600 ohms, 8.000 ohms P-P MODULATION TRANSFORMER	10,000 ohms, 7500 ohms 6500 ohms, 5500 ohms 4500 ohms, 3500 ohms	50W

VIBRATOR TRANSFORMERS

6V/150	6V 0.9MA	150 -- -- -- 25MA
6V/200	6V 2.9MA	200 -- -- -- 50MA
6V/250	6V 3.4MA	250 -- -- -- 60MA

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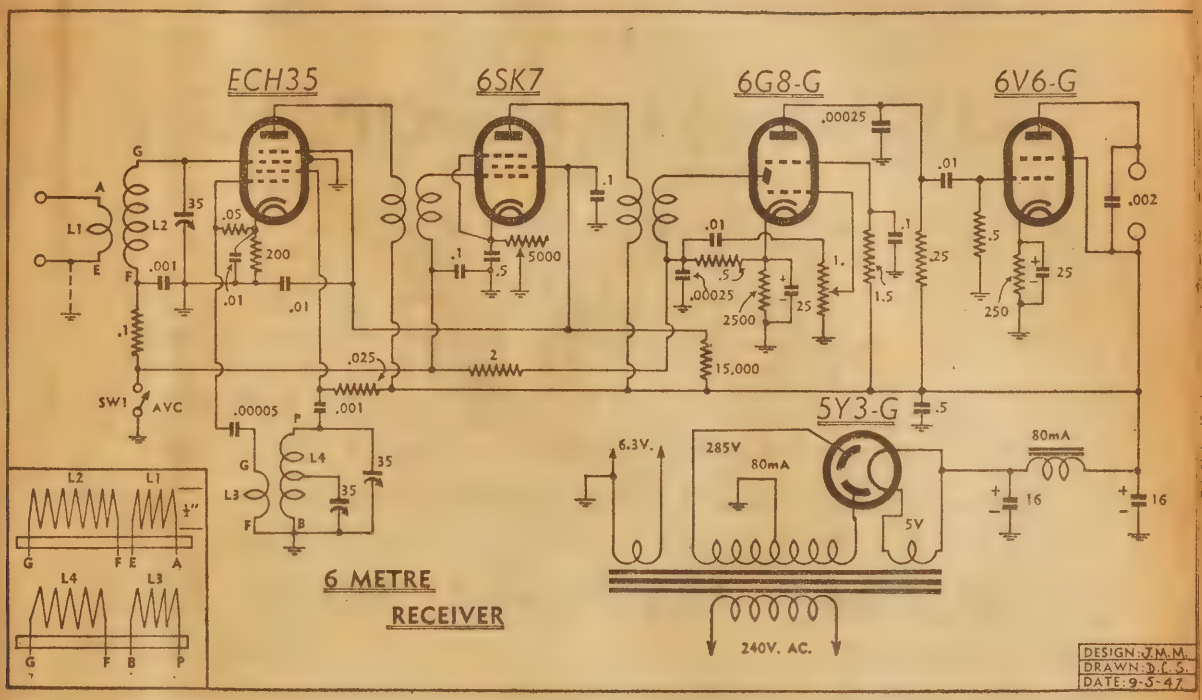
SIX METRE EQUIPMENT IS SIMPLE



Circuit of the six metre receiver. It was designed specifically for simplicity and the use of standard components. A 385 volt transformer may be used with a speaker field of 1500 or 2000 ohms.

The lure of DX and interstate chatter on the amateur bands between 28 and 3.5 mc. has brought the post-war "ham" back to most of the activities he pursued in days gone by. Even the equipment is very much the same as it was back in '39, with the possible exception of better components made available through disposals and other channels.

BUT on the ultra-high frequencies things are not quite the same. Before the war modulated oscillators and super-regenerative receivers were still well in evidence, with one or two of the die-hards branching out into superhet receivers and stabilised transmitters, some of them crystal-controlled.

If you listen on these bands today, or, more specifically, on the 50 mc band, you will find numerous stations transmitting with a quality comparable with that found on any other band. Crystal control is almost universal, and superhet receivers or converters are the order of the day. Strangely enough, many are finding that there is no mystery about "six metres" and that equipment will work there just the same as anywhere else.

During the last few months we have done a good deal of work on six-metre equipment of various kinds, and the circuits shown here will illustrate how normal hook-ups can be adapted for this band. We are not suggesting that the circuits represent the only way of using standard components. But we have found them all to work well, without any awkward "bugs," and we doubt whether any other circuits would show much improvement, either in all-round economy or in performance. All the components used are standard types.

Most of the amateurs in Sydney have been contacted using the equipment described here, and their reports have been most encouraging.

RECEIVERS

One of the surprises when first getting back on the 50 mc band was the performance of our old 2JU 10-valve receiver. The receiver was originally intended to work only on the low frequency bands, and the length of leads in the tuning circuits are certainly not small. Moreover, there are two I.F. bandpass stages with 465 kc intermediates with very sharp tuning. However, the use of a 954 R.F. amplifier and plug-in coils with three-turn secondaries on half-inch formers hit the band straight away, and the set has operated well ever since. If you have a similar type of receiver, don't despair of making it tune to this band.

However, most amateurs will be interested primarily in a simpler way to build a 50 mc set, and for that reason we give the accompanying circuit as a suggestion.

As will be seen, it is a perfectly normal affair, using a single stage of 465 kc I.F. Even the converter is a standard type, the use of plate tuning being the only departure from "dual-wave" practice. This hook-up appears to hold advantages on 50 mc, being less critical as regards "pulling," and we were able to get good conversion with less difficulty as opposed to grid tuning.

The ECH35 is recommended as the converter because of its better conversion characteristics as compared with the 6J8G. This latter valve, however, will work quite well in the same circuit and with the same values, but the overall gain will not be so great.

by

John Moyle

VK2JU

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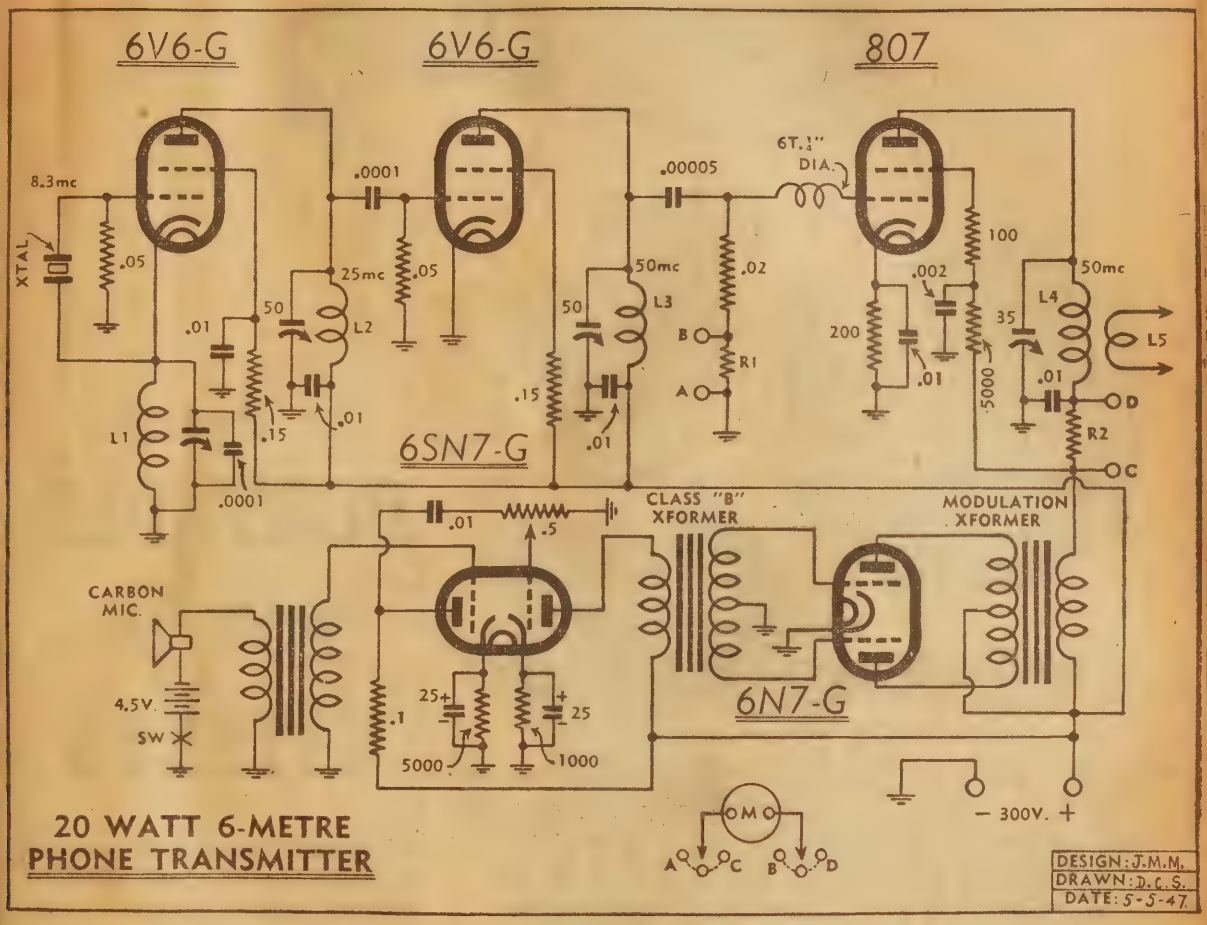
CIRCUIT DIAGRAM OF SIMPLE TRANSMITTER



The modulation transformer should have a ratio of approximately 2-1 stepdown to match a 10,000 ohm modulator load to about 5000 ohms. R1 and R2 are meter shunts if required. We used a straight 0-50 milliameter.

The layout of the set is the same as that used with the 2JU five-valve receiver described in our March issue. The placement of the ECH35 under the chassis on its side, and the short leads made possible thereby, has much to do with the excellent results. The second detector circuit may be varied any way you wish in order to accommodate a B.F.O. if desired. In our case, we were interested only in phone transmissions.

It is not suggested that the single 465 kc stage is the ideal. A set of 1900 kc intermediate might do as well, but would require an extra stage and are not always available. Most people have a pair of I.F. transformers lying round somewhere, and for ordinary use we have found the set to have plenty of gain, so that the latest types of transformers may not be required. In fact, a little less selectivity than the maximum would be a good thing, as our set is, if anything, a bit too sharp in the tuning.

The valve line-up is, of course, subject to reasonable variation. Any R.F. pentode can be used for the I.F. amplifier, such as the 6K7 or 6U7G, and the 6G8G or 6B7 would be O.K. for the second detector. Any of the well-known output pentodes will do for the last socket.

A common 300-volt power supply can be used for both transmitter and receiver, or the receiver can have its own supply. For best result, the voltage should not be less than 200 for the H.T.

The tuning coils were wound on a pair of coil plugs. If the set is intended only for the 50 mc band they could be soldered directly to the tuning condensers, but our set was a coil-changing affair. The oscillator band set condenser will normally operate from one-third to one-half way in mesh, and the signal grid circuit will peak with the plates nearly out of mesh. The tap on the oscillator coil will depend on the type of band-spread condenser, and its exact position will be found by experiment.

As acoustic feed-back is rather troublesome on this band, it would be best to mount the loudspeaker in a separate box, rather than on the front panel. You will find most local stations tuneable at considerable strength.

The small transmitter, the circuit of which is given here, has proved a very successful job. Again, it is straightforward in its design. It has a Tritet oscillator, tripling from a crystal of approximately 8.3 mc., and driving another 6V6G doubler. This in turn drives an 807 as a final amplifier at 50 mc.

RECEIVER COILS

All coils are wound with 18 gauge wire and mounted in valve bases or coil plugs. Diameter is ½ inch.

L1 has 4 turns and L2 has 7 turns spaced about two wire diameters with tight coupling. L3 has four turns and L4 5 turns tapped at one turn. Coupling is adjusted to give as near 200 microamps grid current as possible.

TRANSMITTER COILS

L1 has 8 turns of 22 gauge wire on a 1-inch former.

L2 has 5 turns on a valve base spaced over ¾ inch.

L3 has 4 turns of 16 gauge wire ¾ inch in diameter spaced one diameter.

L4 has 3 turns of 18 gauge wire on a valve base spaced over one inch.

L5 is a link of 2 turns.

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SCREEN VOLTAGES

Both frequency multipliers operate on reduced screen voltages, in order to reduce the drive to the correct amount. A little experiment is permissible here, according to the activity of the crystal, for instance. The idea is to get about 2 mills grid drive to the 807, and we found this was possible without trouble. Experiment with the screen dropping resistors might be a good thing.

In order to keep the condenser rotors at ground potential, the bypass condenser in each tank circuit is connected in series with the tuned circuit, but at the low power level, this does not appear to cause any trouble.

The transmitter was built on the same chassis as that used for the job described in our February issue. The extra 6V6G was accommodated in the socket which previously held the crystal, and the crystal was re-mounted in a special plug just alongside it. As there is one valve less in the audio section, this socket could be used for the crystal to save cutting another hole.

The plate coil of the Tritet is the one mounted above the chassis, and tuned with the condenser also above the chassis. The 50 mc. output coil of the second 6V6G is mounted directly on the condenser under the chassis. The lead to the coupling condenser for the 807 grid then runs straight up through a hole in the chassis to the 807 socket.

R.F. FEEDBACK

We found the matter of R.F. feedback in the modulator a bit more troublesome on this frequency than on other bands. We therefore decided to use a hand carbon microphone, which was found to give excellent quality and require much less amplification. As will be seen, the 6SN7G uses its two sections in cascade, driving the 6N7G B class modulator.

There is somewhat greater tendency for the 807 to oscillate on its own at this frequency, as might be imagined. However, the transmitter was quite stable with the use of the small choke and screen suppressor.

If it is found that the 807 tends to self oscillate with no load, it will almost certainly not do so when loaded even lightly. Apart from neutralising, there isn't much you can do about it, and it shouldn't cause too much worry. The use of a 1-watt series resistor of 25 ohms as a grid suppressor helps, although the drive will probably need increasing by the use of a 50,000 ohms screen resistor and the 6V6G doubler.

A meter has been included to read both grid and plate current for the 807.

Next month we hope to publish details of some further 6-metre equipment, together with pictures of the gear described here.

R. & H. 1947 CALL-SIGN BOOK

WE are planning to produce at an early date the 1947 edition of our call-sign book, the last of which appeared before the war.

The book will contain lists of Australian, and probably New Zealand, amateurs, short-wave broadcast stations of the world, broadcast band stations operating in Australia, and a list of those overseas broadcast stations which are frequently heard here.

In addition, there will be articles on short-wave receivers and transmitters, plus valuable technical data, making the book a splendid reference for all interested in radio.

If you are an amateur, and have an alteration to your call-sign or address you would like included, write to us, marking the envelope "Call Sign." In it, give details, set out in block letters as under:—

VK2JU—J. M. MOYLE, 60-70 ELIZABETH-STREET, SYDNEY.

If you are a new amateur, make sure you send us details for inclusion in the book.

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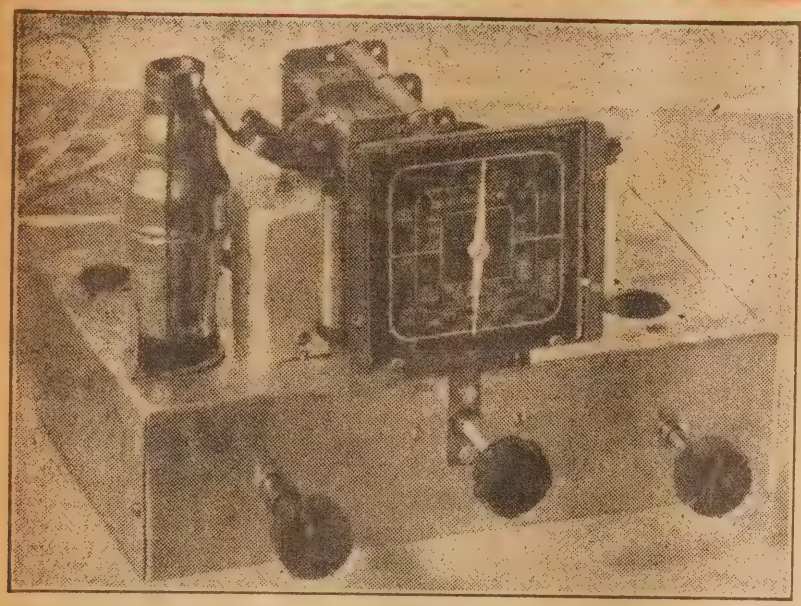
THE 1K5-G ONE VALVE RECEIVER



A general view of the one-valve set.

You have possibly never built a radio set—or at least one using four modern valves. Here is your big chance to make a start. In this and the next three issues we plan to tell you just how to build an economical four-valve set in a wire-by-wire description.

YOU'VE already seen the completed receiver, for it was introduced last month as the "1K5-Four." Its particular interest is that it uses four identical valves which are available cheaply, either new or from ex-Army equipment. We presented the set first in complete form to show readers just what could be done with valves of this general type.

As if to lend point to the article, the very same issue carried an advertisement offering good 1K7-G valves for 6/- each. The 1K7-G has a couple of diode plates and a somewhat smaller pentode section than the 1K5-G, but it could be applied to exactly the same circuit arrangement. Simply earth the two diode plates and connect all other electrodes as shown for the 1K5-G.

ONE-VALVE VERSION

However, that is by the way. Having built and tested the "1K5-G Four" for the May issue, we proceeded to strip it down again and reconstruct it as a one-valve set. The detector occupies exactly the same place on the chassis as it does in the completed four-valve job. So you can purchase the necessary components, and build it up immediately in its simplest form.

Next month we will show you how to add an audio stage, which involves another valve and a couple of extra parts. Change over a couple of leads, put in a few extra wires and the job is completed. And so on for the next two months.

Oh yes! We tried running the set from a vibrator power supply with very gratifying results. We can see a vibrator version looming already!

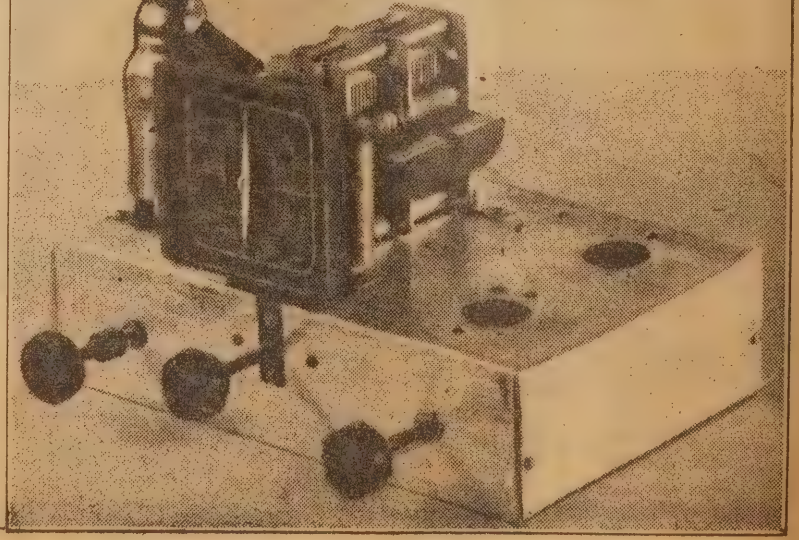
The first thing you need is a metal chassis. You should be able to buy one ready cut by the time this appears in print. Or you can make one yourself from sheet aluminium or mild steel. The chassis measures 10in. x 6¼in. x 2¼in. and you can either put in the holes by guesswork—if you are making it up yourself—or obtain one of our blueprints for the job. The ready-cut commercial chassis is the simplest and neatest proposition, but please yourself.

TUNING CONDENSER

Next you will need a two-gang tuning condenser. Only one section is used for the one-valve set, but the section is there ready for the addition of an R.F. stage at a later date. In any case, a two-gang is much easier and almost as cheap to buy as a single gang of modern pattern.

The next item is a tuning dial to suit. The one suggested is calibrated in kilocycles and station call signs, which is in line with modern practice. The calibrations suit the Stromberg type "H" gang and are fairly close for the modern AWA type. If you have any idea of using a gang condenser other than these, either make sure that the dial calibrations suit it, or else buy a dial calibrated simply with 0-100 scale.

As we explained last month, you can fit this type of set with a front panel and use one of the old style front-of-panel vernier dials. The result looks rather old-fashioned, but will be quite



Another picture of the set taken from a different angle.

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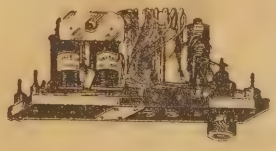

No. 3 Carbon. Press to talk. Cord and plug.

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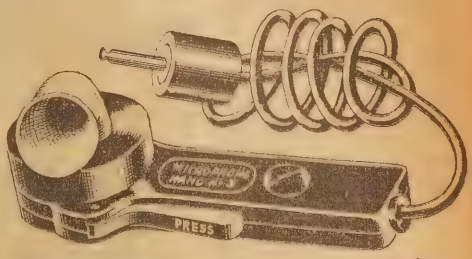
New 15/-



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8 mfd. 525v.	3/6

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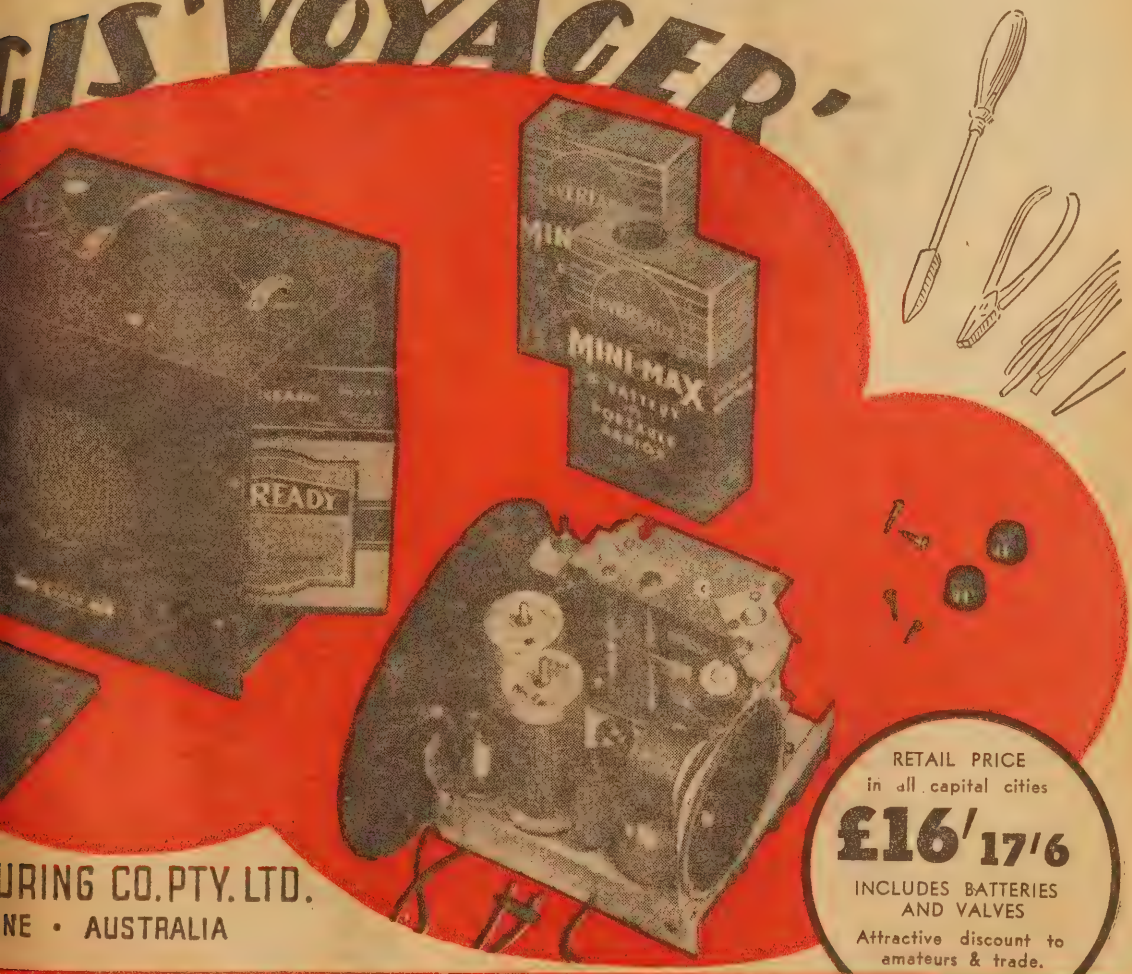
It's a little beauty! The Aegis Voyager is a compact, efficient 4-valve battery-operated portable supplied in kit set form. Every part, including the miniature valves and Mini-Max batteries, comes to you in a well packed carton, all ready for assembly—it's so easy to do with the complete instructional details. When finished it is only 8in. x 6½in. x 7in. and every feature is typical of Aegis quality and ingenuity of engineering. This is the first kit set to be fully licensed by A.R.T.S. & P. which gives you full use of all patents—yet another triumph for Aegis.

GIS 'VOYAGER'



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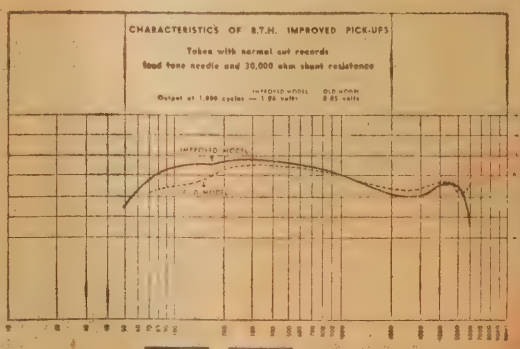

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OK provided the vernier action is smooth.

CHASSIS LAYOUT

The original chassis layout provides for the "H" type gang and Efco CD-17 dial, so that these components should slip straight into place, being held by half a dozen bolts. Other type gang condensers and dials may necessitate drilling extra holes, so that the services of an "egg beater" and a 5/32in. twist drill are called for. Simply make sure that the gang spindle is centred accurately above the chassis and that it engages properly the chuck of the dial movement.

The front section of the gang is used to tune the detector circuit, so that you will need to identify for future reference the upper lug connecting to the stationary (or stator) plates.

For the coil, we suggest you buy a commercial R.F. coil with reaction. This will operate quite well as an aerial coil and meets the circuit requirements when an R.F. amplifier stage is added later. It should have a grid lead coming out the top of the can and, if not already in place, you will have to fit the lead yourself.

Remove the coil carefully from the shield can and, by referring to the manufacturer's data, identify the "grid" or "G" pin. The lead can be attached to the bottom half of the lug and led up through the can, or you may be able to solder it to the tip of the lug above the coil base. If the latter is moulded trolitul, by the way, solder quickly and cleanly. Avoid heating the wire more than necessary, or moving it about while the trolitul is softened by the applied heat. Take the grid wire up through the top of the can, reassemble the coil and mount it in place on the chassis.

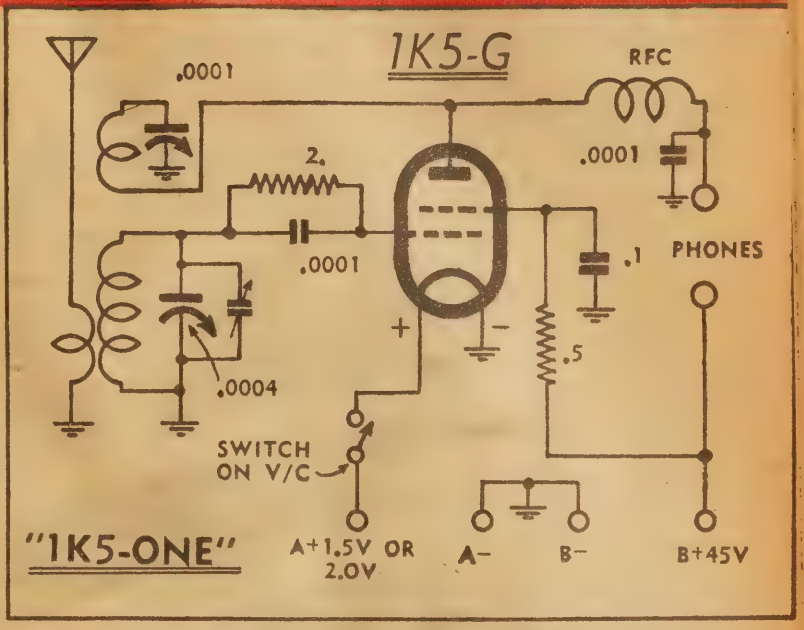
SOCKET MOUNTING

Next job is to mount the octal valve socket, facing the centre keyway in the same general position as shown in our wiring diagram. The base of the valve shield generally mounts under the same bolts which hold the valve socket.

Two more valve sockets have to be mounted on the rear of the chassis. The 6-pin socket is for the battery connections, while the 4-pin socket will ultimately serve for the speaker connections.

On the front edge of the chassis go the two panel controls, the .0001 mfd. reaction condenser and the combined volume control and switch. The volume control is naturally not required for a one valve set, but the "off-on" switch is necessary. Rather than buy a switch and discard it at a later date, we suggest you purchase the combined volume control and switch to begin with and it is there ready for future use.

THE ONE-VALVE 1K5-G CIRCUIT



The circuit is quite a simple affair.

RESISTOR PANEL

A 7-position resistor panel will ultimately be required, so this can be mounted in position with the aid of a couple of long ¼-inch bolts. Locate and drill the mounting holes in the chassis and insert the long bolts, locking them in place with a nut. Now run another nut down to about one inch from the chassis, slip the resistor panel in place and lock it with two more nuts. Slip a solder lug under the rear nut to act as an earth point.

The final job of assembly is to mount the two terminals. The "earth" terminal can be mounted direct to the chassis base, but the aerial terminal must be insulated from it with two or three suitable bakelite washers. Now for the job of wiring.

From the positive filament pin on the battery socket, run a lead across to one side of the off-on switch. The other side of this switch connects to the positive filament pin of the 1K5-G detector valve. The negative battery lead can be earthed to the lug at the end of the resistor panel, while the negative 1K5-G filament pin can be earthed to another solder lug beneath one of the coil mounting bolts. You will have no difficulty in identifying these pins and leads by referring to the underneath wiring diagram.

WATCH COIL CODES

Pin three on the 1K5-G socket—that is the plate—can now be connected to the coil lug identified by the manufacturer as "detector plate" or some phrase meaning the same thing. Be guided by the coil manufacturer's coding rather than our diagram, as all coils do not use the same terminal arrangement.

Another lead goes from the "detector plate" lug on the coil to one side of an R.F. choke, the other side of the choke connecting to one of the lugs on the resistor panel. The R.F. choke can be mounted away from the chassis on a long bolt, or it will hang quite rigidly in mid-air if the leads to it are made with stiff busbar.

One lead of a .0001 mfd. mica condenser connects to this same lug on the resistor panel, the other side of the condenser being earthed to a solder lug beneath one of the gang mounting bolts. Now put in the lead connecting across to one small pin on the speaker output socket.

Coming to the high-tension wiring,

PARTS LIST

- 1 Chassis, 10" x 6½" x 2½".
- 1 "H" type two-gang condenser.
- 1 Tuning dial (Efco type CD/17 or similar).
- 1 R.F. coil with reaction.
- 1 .0001mfd. midget reaction condenser.
- 1 0.5 meg. potentiometer with "off-on" switch.
- 1 Octal socket, 1 6-pin, 1 4-pin.
- 1 R.F. choke.

CONDENSERS

- 1 0.1 mfd. tubular.
- 2 .0001 mfd. mica.
- 1 Trimmer condenser (if not fitted to gang).

RESISTORS

- 1 2.0 megohm.
- 1 .05 megohm.

VALVES

- 1 Type 1K5-G.

BATTERIES

- 1 45-volt B-battery.
- 1 1.5 volt cell or 2.0 volt accumulator.

SUNDRIES.

Earphones, 2 terminals with insulating washers, 1 grid clip, 6-pin battery plug, 4-pin speaker plug, hook-up wire, tinned copper, spaghetti, 7-position resistor panel, nuts, bolts, washers, solder lugs.

MAXWELL'S RADIO

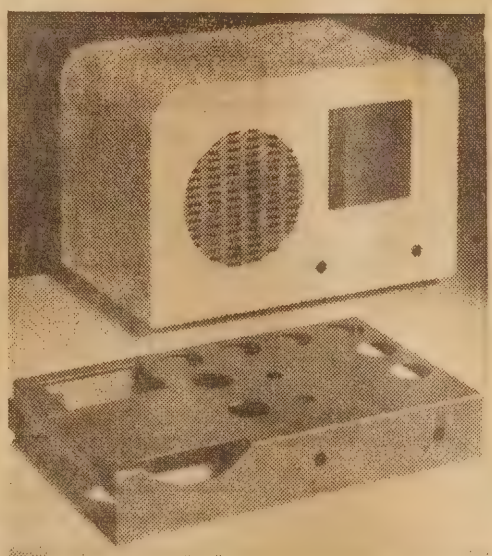
CABINET, CHASSIS, DIAL

(the lot)

Small Size 36/6
11" x 7" x 7"

Large Size 39/6
14" x 7" x 7"

Ideal for standard 4 or 5 valve sets.



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the B-minus lug on the battery socket can be bridged across to the A-minus lug which goes to chassis. The B-plus lug just opposite, connects across to the remaining small pin on the speaker output socket. Two more leads go to lugs on the resistor panel in positions where they will suit the requirements of the audio stages yet to be added.

A 0.5 meg resistor (green body, black end, yellow dot or band) connects from one of these B-plus points to the screen pin of the detector valve. And from the screen pin a 0.1 mfd condenser bridges to an earthed solder lug at a nearby valve socket mounting hole.

Now run a lead from the aerial terminal to the coil pin which will be listed in the manufacturer's data as "plate" or "P." The "B-plus" or "B" pin can be returned to an earthed lug. Remember we are using an R.F. coil temporarily as an aerial coil, hence the discrepancy in the primary connections.

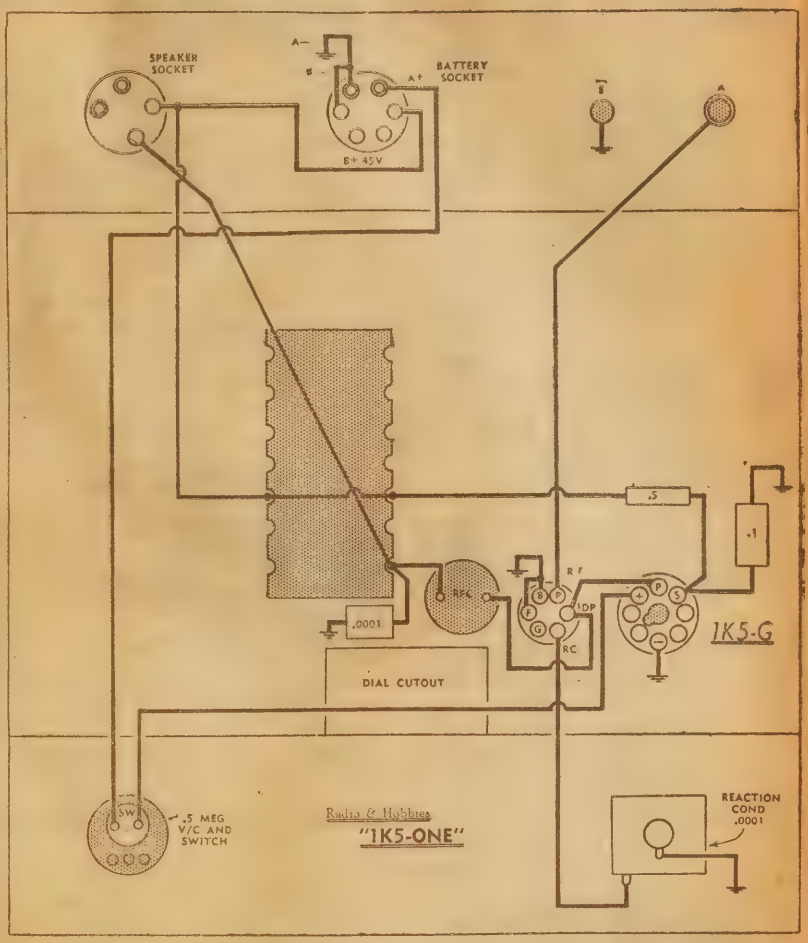
REACTION CONDENSER

The coil lug marked "reaction condenser" should be bridged across to the stationary plates of the reaction condenser. The moving plates will already be earthed by the mounting bush. Make sure, by the way, that none of the bolt heads securing the stationary plates bear against the metal chassis. That completes the underneath wiring.

Now turn the chassis the right way up, and connect the grid lead protruding from the top of the coil to the stator plates on the front section of the tuning gang. Remember, we mentioned this lug earlier.

Obtain a trimmer condenser and solder the lug connecting to the inside trimmer plate to the same stator plate lug on the gang. The lug connecting the outer trimmer plate can be soldered to the frame of the gang condenser. This trimmer will not be necessary, however, if the gang is already fitted with trimmer condensers.

ONE-VALVE WIRING DIAGRAM



This diagram shows how the components are connected together.

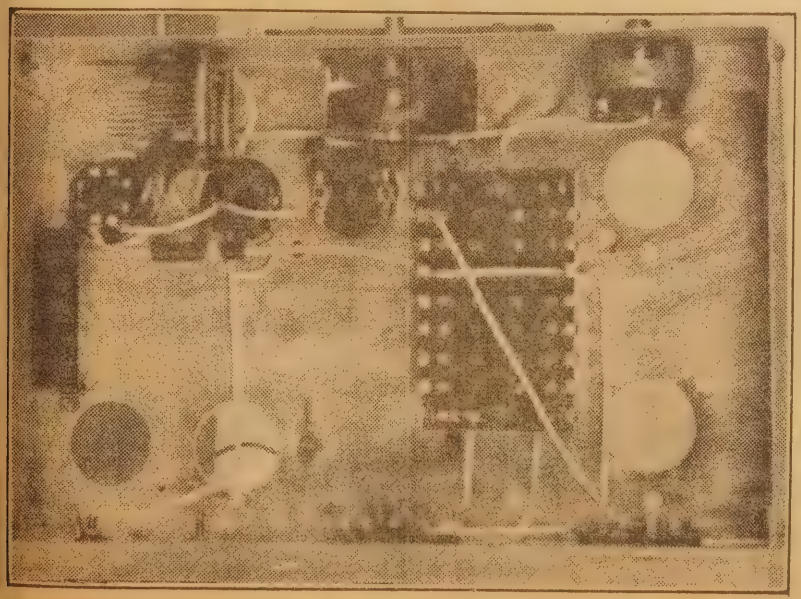
By adjusting this trimmer with the set in operation, you can track the stations with the dial calibrations.

Finally, take the .0001 mfd. grid condenser and 2 megohm grid resistor and twist their respective connecting wires together. The condenser may be marked ".0001" or "100." The latter figure signifies 100 mmfd., which is the same as .0001 mfd. Color code for the resistor is red body, black end and green dot or band.

Slip a length of spaghetti over one lead to the resistor-condenser combination and solder to the same stator plate connection as the gang condenser. The other lead may have to be extended sufficiently so that it will connect to a grid cap attached to the top of the 1K5-G detector.

BATTERY LEADS

For the battery leads, obtain a 6-pin plug or the base from a discarded 6-pin valve. Insert the plug in the battery socket and identify the pin connecting to the "A-plus" wiring. Sweat a colored lead into this pin and note the color for future reference. Another lead can be con-



A photograph taken under the chassis of the original receiver.

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Complete except valves.
Brand new Admiralty Power Packs 230v. A.C. input, 350v. D.C. at 200 Ma. output. Complete except valves £4/-/

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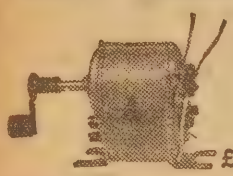

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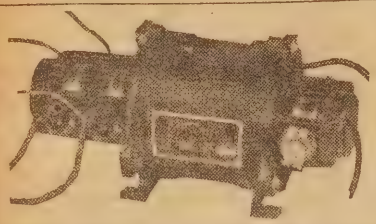
2v. ACCUMULATOR, 25 amp., 10/6



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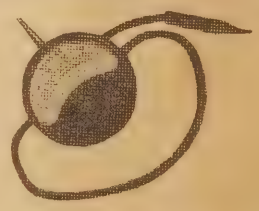
Cathode Ray Chassis

suit 905 tube or its equivalent. All controls, gain, focus and bias. Range horizontal and vertical. Shift and synchroniser. **£3**



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nected to the remaining large pin for "A-minus."

Twist these two filament leads together and brand them carefully with cardboard or metal tags.

Similarly identify the "B-plus" and "B-minus" pins, attach the battery leads, twist them together and tag for identification.

Now obtain a 4-pin plug and connect a couple of wires to the two thin pins. These wires can be taped individually to your earphone leads, until such time that they are transferred to a loudspeaker.

Your set is now ready to test. Check it over carefully and plug in the 1K5-G valve. Connect the aerial and earth, connect the "A-battery" leads to a 1.4 volt or 2.0 volt battery and switch on. You should just be able to see the filament glowing a faint red by peering down the top of the glass envelope in a darkened room. Or you can test the voltage across the filament pins with a torch globe.

OPERATING

If the filament circut appears to be OK connect to the B-battery. 45 volts is ample for this one valve set. Rotating the reaction condenser should produce a hiss as the detector goes into oscillation with increasing condenser capacitance. Then tuning the main dial should bring to light whistles on station carriers.

Don't operate the set this way, but gradually move the reaction condenser plates out of mesh until the heterodyne whistle just stops. At this point the signal should be heard to best advantage. The reaction condenser needs to be adjusted for each alteration of the main tuning dial, but you will soon get the hang of it. But remember the golden rule—don't let the detector continue to oscillate while you listen. It will spoil your own reception and also cause interference in neighboring receivers.

If the set won't oscillate all over the band, use a higher B-plus voltage or reduce the value of the screen resistor from 0.5 megohm to 0.25 megohm. Increasing the value of this resistor, or reducing the plate voltage will decrease the reaction effect.

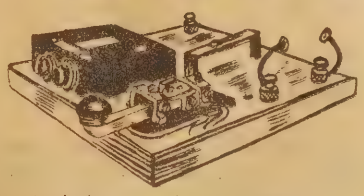
For best results, the earphones should be of modern design and have a resistance of from 2000 to 4000 ohms. However, military type 400 ohm earphones often work surprisingly well.

AERIAL

You will need 40 or 50 feet of aerial, erected outside and as high as possible, and an earth wire running to a water pipe or to a pipe driven into moist ground. In country districts a much longer aerial can be employed. A long aerial gives loud signals but may cause stations to cut in on one another, so experiment to find the best aerial for your purposes.

And finally, watch for our next issue, which will tell you how to increase the power of your set by adding an audio amplifier stage.

BARGAIN RELEASE



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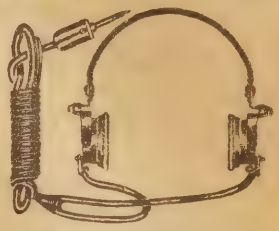

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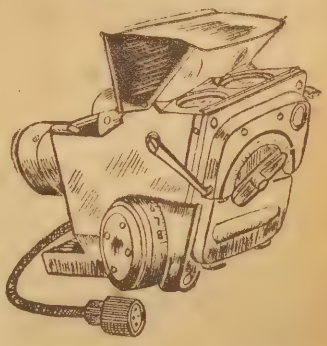

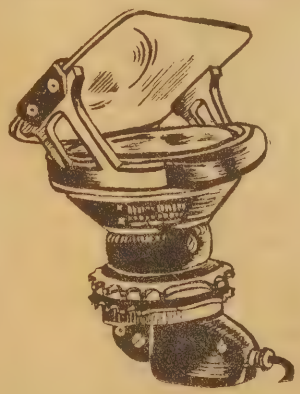

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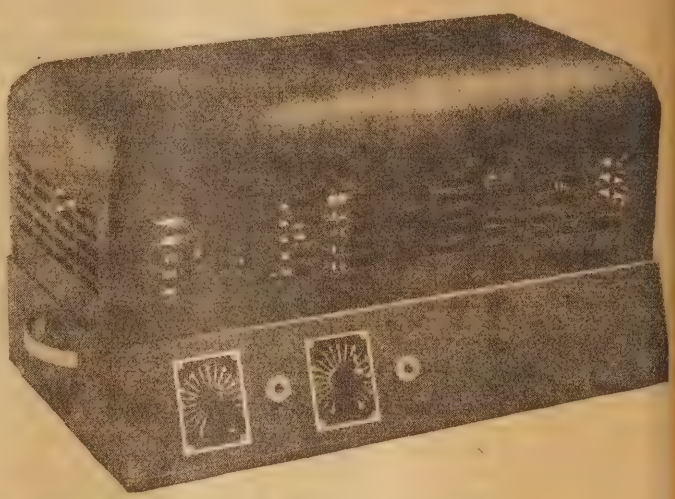

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GETTING RESULTS FROM A TRITET

Although a good case can be made for the use of a low powered crystal oscillator, for amateur work at least, circuits which can deliver appreciable power at various harmonics have undeniable attractions. Stability and crystal current are the two main limiting factors, and to a certain degree, they are inter-related.

THE Tritet oscillator is probably the most famous type used by the amateurs today. You will find arguments for and against it brought forward wherever technicalities are discussed. Such discussions reveal that many are unable to obtain satisfactory results from it. The main criticism appears to be that the circuit is "hard on crystals."

Actually there is no reason why the Tritet circuit should be any harder on crystals than on any other similar circuit. It is true, however, that a badly adjusted Tritet will cause heavy currents to flow in the crystal circuit, with the danger of a crystal fracture if high plate and screen voltages are used.

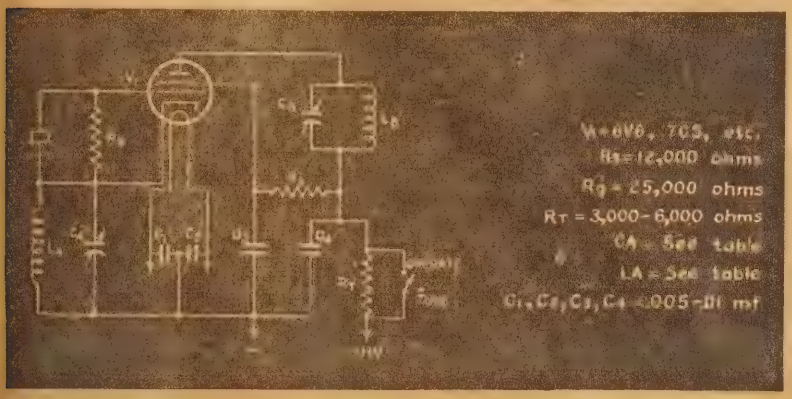
The information given here is issued by the famous Bliley crystal makers of USA. A glance at the graph shows very clearly how the crystal current will soar unless the cathode circuit is properly adjusted. Most good crystals are capable of standing a current of 100 milliamps without undue stress; but if this current is exceeded, there is every possibility that the crystal will be damaged and even fractured.

The only essential information not included in this circuit is the maximum permissible high-tension voltage. In the case of the 6V6 oscillator, up to 350 volts will probably be quite safe, although if the valve is used to drive another beam tube amplifier, as will most probably be the case, the voltage necessary to obtain good output, even on the third and fourth harmonics, will probably not exceed about 200 volts.

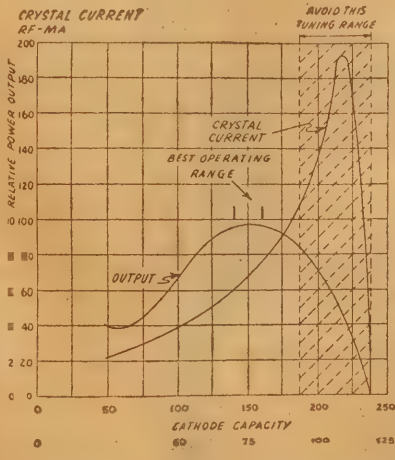
Here are the comments as issued by Bliley:—

The Tritet crystal oscillator can be a source of pride and joy—or it might be a first-class rock-crusher. This has been discussed in many articles over the past years. Completely satisfactory performance, without casualties, can be obtained if you:

1. Use reduced plate and screen voltages when you tune up and whenever you change the cathode tank tuning.
2. Always tune from the low C side until maximum output is obtained. See curve shown on this page and avoid cross-hatched danger zone.
3. Unless you have a well-screened tube such as an 802, never use a Tritet for straight-through operation without shorting out the cathode tank. Use a switch, not a bent plate on the cathode condenser. Tuning through full capacity to short out the cathode circuit by means of a bent condenser plate takes the tuning through the danger zone.



This is the circuit as recommended by Bliley for the Tritet oscillator. The coil details are given below. The high tension voltage is not specified, but between 250 and 350 volts should be about right. We suggest increasing the value of Rs if the output is more than required. This will lower the screen voltage, cathode current, and crystal current. A 60-100Ma. torch bulb in series with the crystal will serve as an indicator of crystal current. An ordinary meter is not suitable for this purpose.



This graph shows the relation between cathode tuning and crystal current. The top line of capacity figures, in mmfds., refers to 3.5mc. crystals, and the bottom line to 7mc. crystals, with second harmonic output in each case.

CRYSTAL FREQ	*L_A μh	1½" DIAMETER COIL SPEC	C_A mmf	OUTPUT FREQ
80λ	4.0	10 TURNS-#18 E CLOSE WOUND	250	40λ
40λ	2.0	6 TURNS-#18E 5/8" COIL LENGTH	125	20λ
20λ	1.0	3 TURNS-#18E ¼" COIL LENGTH	60	10λ

* CATHODE INDUCTANCE

This table gives details of the cathode tuning circuit for a Tritet.

A NOVEL CRYSTAL SOCKET

A socket which will accommodate all sizes of crystal holders is something for which most amateurs have sighed from time to time. We have not seen anything produced commercially which will do the job, but in the February issue of Q.S.T. there appears a suggestion which seems to fill the bill admirably.

THE idea is to get two sockets, one a five-pin type and the other an octal type, preferably of the moulded Amphenol variety.

The bottom section of the five-pin socket is cut away, leaving a portion ¾ inch deep measured up from the "flat," which includes the three wide-spaced holes with their contacts.

It is replaced with a matching section cut from the octal socket, which includes pins 4, 5, and 6, symetrically placed.

The two sections are cleaned up and filed flat so that they may be cemented together. For extra strength, the locking ring may be cemented in place after the remade socket is mounted on its metal support.

If two adjacent pins of the five-pin section are connected together, and to the nearest octal pin, they will form the grounded side of the socket. The third pin of the five-pin section is joined to the octal pin adjacent to it, to make the grid connection.

You will now find that any of the three standard crystal holders can be plugged in so that one pin is "earthed," and the other connected to grid.

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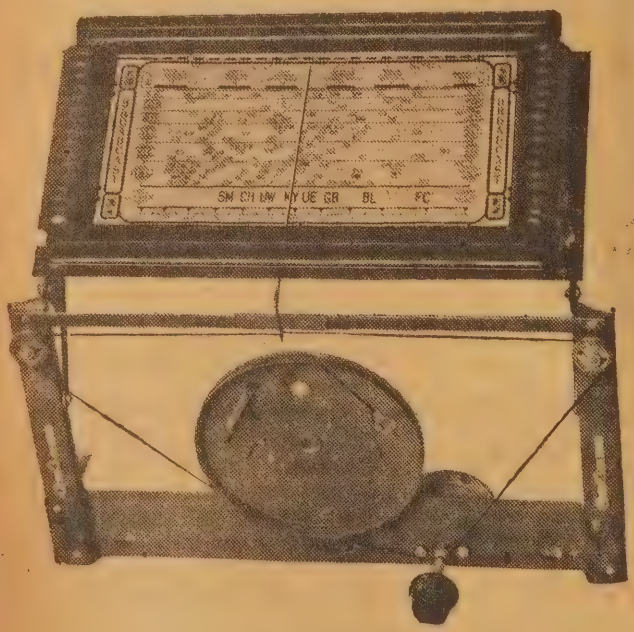

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New Edition of A.R.R.L. Handbook

Now that the war is history, we can expect some of the regular post war publications to swing back to the customs and routines of yesterday. Some of them will undoubtedly need drastic review.

Recently we received a copy of the latest "Amateur's Handbook" published by the American Radio Relay League, which by the way, does not seem a very accurate or descriptive title for the American Amateur organisation.

This handbook is recognised as one of radio's most useful and valuable references. It is sufficiently simplified to be intelligible to the average enthusiast, at the same time being comprehensive and accurate enough to appeal to the engineer.

This latest edition shows a number of changes over those which have appeared in the past. The elementary sections are much the same, with the addition of certain material to include latest techniques. The constructional section, however, shows evidence of more than a little pruning and revision.

ALL SUPERHETS

In the short-wave receiver section, it is interesting to note that all the sets, even the simplest of them, are superhets. The ARRL appears to have finally discarded the "detector with reaction" principle even for beginners. While this is in line with modern thought, it is a pity that at least one simple circuit of this type was not included. It is an indication at any rate, that times are changing.

In the transmitter section, a prominent feature is the free use of bandswitching in transmitters, even simple ones. This would seem to mark the demise or partial demise of the plug-in coil. We fancy Australian amateurs are still faithful to the extremely simple method of changing bands with plug-in coils, and will continue to do so. However, good bandswitching is a good thing, and the logical way to build more elaborate equipment.

AUSTRALIAN CONDITIONS

Unfortunately many of the designs use valves which are not easily available here, and a certain amount of improvisation will be needed on the part of anyone who follows the designs in detail. Here again the difference in Australian conditions and those in America is underlined. Comparatively few designs are for transmitters on the 50 or 100 watt limit.

The usual wealth of reference material has been amplified in this new edition, which still remains a "must" in the bookshelves of all radio men. Its 450 odd pages of information and guidance are still a bargain at the price.

THE RADIO AMATEUR'S HANDBOOK, published by the ARRL, 1947 edition. Our copy from McGill's, Elizabeth-street, Melbourne.

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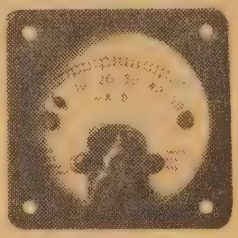

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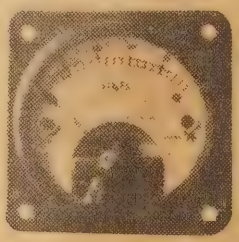

PATON 0-100 VOLT A.C. METERS, complete with internal rectifier and shunt.

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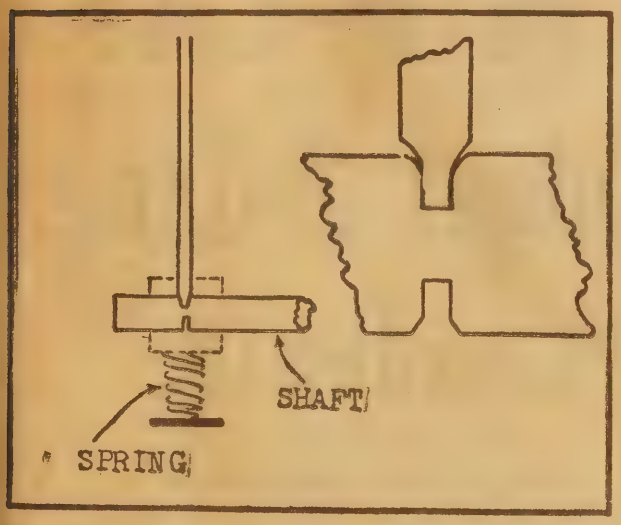
FROM THE SERVICEMAN WHO TELLS

There are new tricks in every trade and I learned a very handy one last week. Have you ever been close to profanity about a worn out dial drive? I was just about on the point of it last week when a friend came to the rescue with a very simple remedy for the trouble.



Scraping the edge of a dial drive disc allows pressure to be exerted once more on the sides of the wedge.

YOU probably know the type of dial drive quite well, as it was employed very widely in the early thirties. A round metal plate drives the condenser shaft, the edge of the plate being wedge-shaped. This edge rides in a narrow slot, machined in the spindle which carries the knob. Upward pressure between the spindle and the plate edge is maintained by a small, spiral spring.

After a few years of use, the edge of the plate tends to wear thin, especially near the centre of the tuning range, with the result that the dial begins to slip.

This particular set had not been in use for quite some time and I had to get it back into working order. As might be expected, the first job was to remove the chassis from the cabinet and get rid of all the dirt and cobwebs which covered it. New electrolytic condensers had to go in, new power cord, and a couple of other items in the electrical circuit. The controls, however, were very rough in their operation.

A spot of oil worked into the two potentiometer bearings restored their normal smooth operation, but I looked at the dial and shuddered. It was a well-worn wedge movement and seemed almost certain to slip the moment any oil came near the wedge. But the bearing was bone dry and going rusty, so there was no way out of it.

Sure enough, the moment I applied a spot of oil to the movement, it slipped badly in the centre of the tuning range, around 2GB and 2UE. Wiping away excess oil and increasing the spring tension did not improve matters overmuch. It looked like fitting a new dial movement—a job that I somehow don't relish.

As luck would have it, a friend happened to be in the shop at the time who is of a mechanical turn of mind. Seeing my perplexity he examined the dial carefully, then reached for a file. Using a corner of the tongue, he pared away a few shavings from the edge of the brass dial plate, put the spindle back in place and it worked like a charm.

"You see," he explained, "the brass plate had worn to the point where the extreme edge was simply riding in the bottom of the groove. Paring away the edge has allowed the spindle groove once more to grip the shoulders of the wedge, and the dial operates normally."

So, next time you strike this trouble, mark the worn region of the drive plate and, with any suitable cutting tool, pare away carefully a shaving from the edge of the plate. The amount of metal cut away need be only a few thousandths of an inch and certainly not too much for the spring to take up in the normal way.

Well, I'm darned!

COIL CONTACTS

A short-wave listener, keen but not technical, acquired a well-known make of American communication receiver. I must admit to a feeling of envy as he laid it on the bench with the air, . . . "it's all mine." What radio enthusiast hasn't a soft spot for these jobs which cover the band from here to there and feature everything that opens and shuts? Pardon the terms, but you know what I mean!

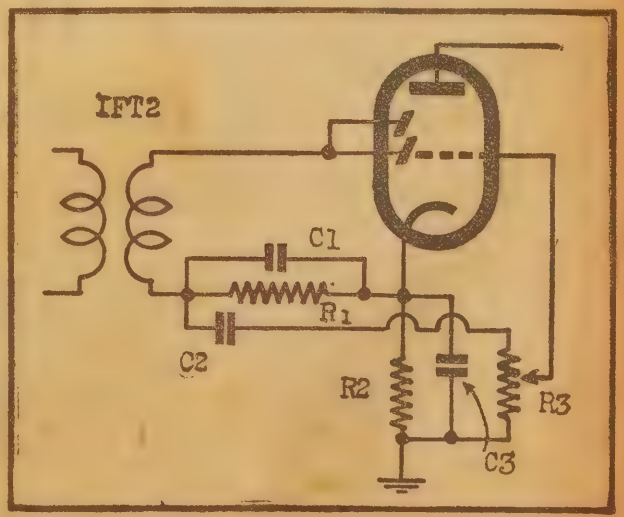
This job wasn't new but was, nevertheless, in good condition. However, its performance was erratic.

As much as anything for interest, I tested the valves and prodded around under the chassis but could see no obvious faults. But there was a certain "touchiness" about the chassis which was not in keeping with the mechanical excellence of its general construction.

It was of a type in which the coils for each band plugged as a unit into a space below the tuning dial. Any pressure on the coil box handles produced a certain amount of noise, so I began to suspect contact troubles.

Closer examination showed that one or two of the contacts were bent up to an extent where they could not have been making a very good wiping contact with the points on the side of

If condenser C3 becomes low in capacitance, an audio voltage may be developed across R2, preventing the volume control from reducing the signal to zero.



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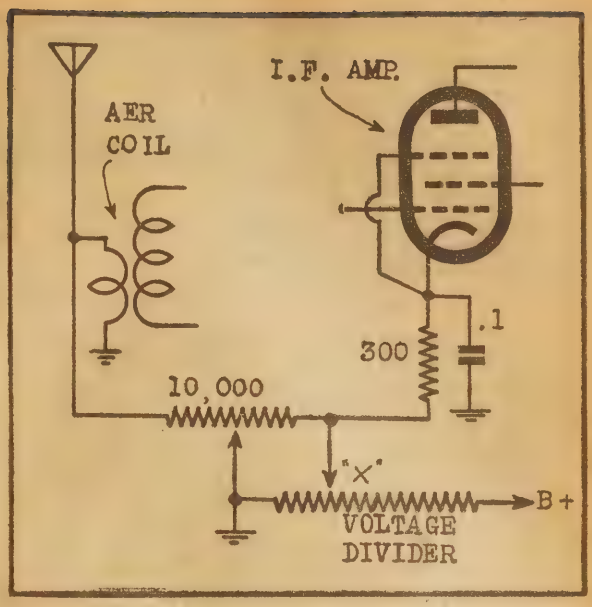
the coil unit. So I carefully pressed these down into line with the others and wiped over the lot with some carbon tetrachloride.

Examination of the coil boxes showed a certain amount of grease and dirt on the contact studs, so these were cleaned up by a very light rub with fine emery cloth and then with a rag soaked in carbon tetrachloride. After that, the receiver gave no further trouble.

I mention this because a few of these receivers have found their way into readers' hands since the war. Another point is, of course, that the remarks apply to a variety of other plugs and sockets which surround the usual radio chassis. The pins of plug-in coils can often do with a clean up and the contacts on the socket adjusted to bear more firmly against them. Old type wafer valve sockets of the four and five pin variety were often poor in this respect and, last but not least, the connections to the power point. Attention to these matters will sometimes clear up noisy operation of a receiver.



The potential on point "X" is fairly critical. Too high or too low a value causes improper operation of the control.

MINIMUM VOLUME EFFECT

An effect which one encounters with monotonous regularity is failure of the volume control to reduce the output of a receiver to minimum. The condition alone seldom prompts a service call, but it is one of the "funny effects" which clients complain about when a serviceman is on the spot. The way people use and abuse the adjective "funny" is funny indeed—but that is by the way.

You probably know the effect I am referring to. Turning the volume control right off still leaves enough output from the speaker for the programme to be heard clearly in a quiet room. Occasionally, advancing the volume control from its minimum position alters the character of the sound, either in tonal balance or distortion level, before the normal increase in volume becomes apparent.

The whole effect is disconcerting if one wants to turn the set off temporarily during conversation, or a phone call, while the possible distortion may ruin low-level listening.

The effect can be very pronounced in a reflexed type of receiver but, fortunately perhaps, these are not very numerous. The type of circuit I refer to is, however, almost universal.

Figure 2 shows a typical circuit for a diode detector and audio amplifier stage, using a duo-diode triode valve. The cathode bypass condenser C3 is the villain of the piece. If this condenser dries out and falls to a fraction of its rated capacitance value, the volume control may cease to be fully effective. Just how this comes about is not difficult to follow.

Signals at intermediate frequency are impressed on the diode circuit and generate audio voltages across the diode load resistor R1 and the bypass C1. These are normally fed through C2 to the volume control R3 and picked off by the moving arm for application to the amplifier grid.

Examination of the circuit will show that the resistors R2 and R3 are effectively in series across the diode load R1, so that, if the bypass C3 is ineffective, part of the audio voltage developed across R1 must necessarily appear across R2. Even if the grid is earthed by turning the volume control right off, the audio voltage across R2 appears between the grid and cathode of the triode section and produces some output in the plate circuit.

The intensity of sound from the loudspeaker then depends on the values of R2 and R3, the actual condition of C3 and the voltage gain of the audio amplifier. The higher the ratio of R2 to R3, or the higher the audio gain, the louder will be the initial output from the loudspeaker.

The cure, of course, is to replace the cathode bypass C3 with a new condenser, using the highest available value; 25 mfd. is a good choice, although one often has to make do with a 10 mfd. unit.

The exact circuit arrangement varies from one set to another and the operation of the circuit may do likewise, but, if you encounter this effect, the first step should be to replace the cathode bypass condenser.

If that fails to cure the trouble, it is in order to suspect the volume control itself, as it may not be reaching zero resistance between the moving arm and earth. This can easily be verified by turning the volume control to the "off" position and shorting the centre lug to the "earth" lug with a screwdriver.

OVERLOAD DISTORTION

Mention of volume control problems reminds me of another set I handled just recently. Some people had just moved into the district and brought with them their 1933 vintage superhet Autodyne detector, manual volume control and all the other characteristic features of the design era.

A couple of stations are particularly strong in the area and signals on these stations were very distorted. This puzzled the people no end, because the set performed well enough in the former location. However, volume control problems with receivers of this type are not at all uncommon to servicemen.

The trouble springs from the fact that there is normally only one stage available for gain control purposes, namely, the IF amplifier stage. In the vicinity of a strong local station, an appreciable signal voltage is impressed on the grid of the frequency changer and it is considerably amplified before it appears as an IF voltage on the grid of the IF amplifier valve.

To limit the output from the loudspeaker to the desired level, it becomes necessary to reduce drastically the gain of the IF amplifier valve by applying a large negative bias between grid and cathode. Despite the fact that the IF amplifier valve is always of the variable-mu type, the combination of large bias and input signal produces very serious distortion of the envelope in this valve—so much so that quality of either speech or music is intolerable.

The usual course adopted by set designers at this time was to arrange the volume control circuit so that operation of the control simultaneously increased the bias on the IF amplifier valve and tended to short out the aerial coil primary winding. The circuit in the set under consideration was one of several similar arrangements.

BIAS VOLTAGE

Moving the earthed arm to the right ultimately earths the lower end of the 300-ohm cathode resistor, allowing the bias on the valve to reduce to the usual 3.0-volts minimum. At the same time, the whole of the 10,000-ohm potentiometer element is in parallel with the aerial coil primary, so that the loading effect is quite negligible.

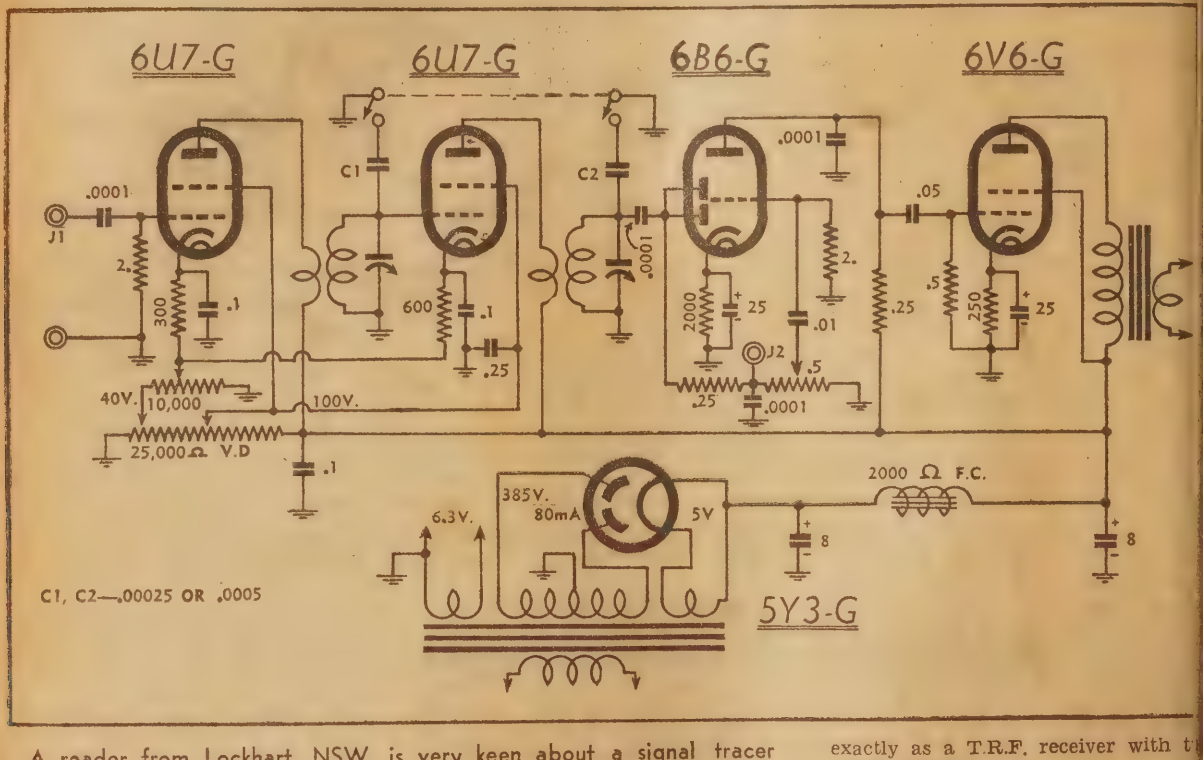
Rotating the control in the opposite direction applies an increasing bias to the cathode of the valve and ultimately shorts the aerial direct to chassis. To ensure that the full necessary bias is developed in the cathode circuit, one end of the potentiometer

(Continued on page 75)

A READER BUILT IT!

Gadgets and circuits which we have not actually tried out, but published for the general interest of beginners and experimenters.

SIGNAL TRACER FROM OLD T.R.F. SET



A reader from Lockhart, NSW, is very keen about a signal tracer which he has built up for use in his service business. Though of simple design and built from oddment parts, the instrument can save a lot of time in tracing fading and intermittent service troubles.

MR. H. M. TURNER, Box 15, P.O., Lockhart, NSW, the designer, says:

"A well-known trade set developed the fault of dropping in volume, but was so touchy that application of the test prods in any position restored normal volume.

"By connecting the tracer to the audio stages, detector, and I.F. stages in turn, the fault was eventually found in the 6A8."

The circuit itself is a simple T.R.F. arrangement which uses standard R.F. coils. Two fixed mica condensers are switched in parallel with the tuning gang to extend the tuning range beyond the low frequency end of the broadcast band. This allows the tracer to be used over the broadcast band and at the usual 460kc I.F. setting for superhet. receivers.

Coil switching could be provided to cover additional frequency ranges, but the complication was not considered necessary by Mr. Turner.

The R.F. sections of a receiver can be checked by plugging the test lead into jack 1, which feeds the signal to the grid of a 6U7-G R.F. amplifier. The signal is then tuned in at the appropriate frequency by rotating the main tuning dial. It is passed on to the second 6U7-G R.F. amplifier and thence to the diode detector.

In the circuit originally submitted by Mr. Turner the plates and screens of the R.F. amplifier valves were fed from tappings on the voltage divider, arranged to give just the right amount of R.F. gain for his particular location. In the circuit shown above, the operating voltages are standard for this type of valve and variable cathode bias has been added to permit control over the R.F. gain.

The audio section of the receiver is of straightforward design, requiring little comment.

Coupling the aerial to the tracer allows signals to be tuned in the normal way, the instrument behaving exactly as a T.R.F. receiver with t tuned stages.

The signal from the diodes can diverted to the audio end of a receiv under test. This section of a set c therefore be checked for intermitte faults while other work is proceedi on the bench.

Alternatively, the functions can reversed and the signal from the tur portion of a receiver can be fed throu the audio system of the tracer. Te are possible on pickups, high outp microphones and loudspeakers.

The original tracer was built fr parts salvaged from an old-style T.R receiver. In fact this type of recei can be adapted for the purpose w very little alteration. Modern va types are suggested in the circuit, b any equivalent types of much older p tern would suit.

The mechanical construction c follow the inclinations of the dividual serviceman. It is possible add the one or two extra termin and controls necessary to a T.R.F. ceiver chassis and leave it in much same original form. Alternatively front panel can be added and chassis housed in a cabinet to giv more the appearance of a test inst ment.

TRADE REVIEWS AND RELEASES

FERGUSON'S MARKET 'VIBRAPOWER' UNIT

Conversion of receivers from battery to vibrator operation is simplified by the release of the Ferguson "Vibrapower" unit. Designated as type VS 140, it is designed to operate from a 6-volt accumulator.

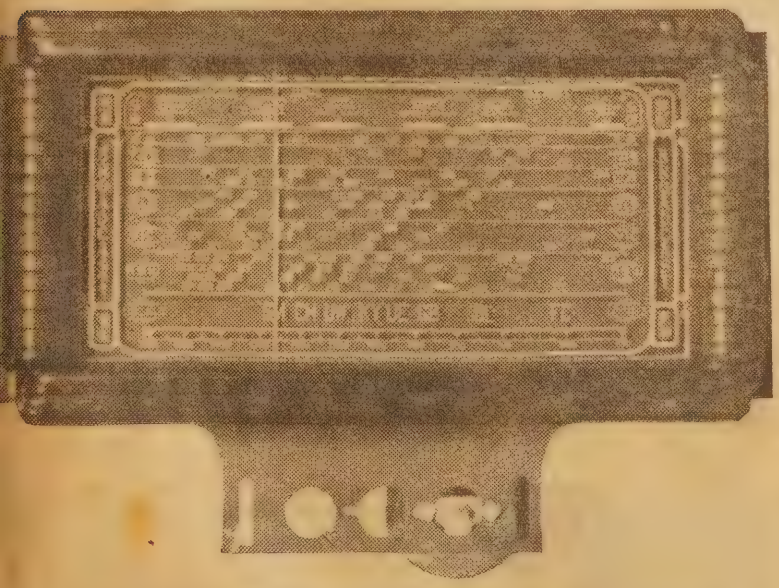
THE "Vibrapower" unit is housed in a fabricated steel case measuring 9½in. by 6in. by 4in., finished in grey wrinkle duco and fitted with rubber feet. A chromium plated carrying handle is provided for ease of handling, the net weight being 10lb. It contains complete high tension and low tension filtering, so that the output is free from both R.F. and A.F. noise.

Connected to a 6-volt accumulator, the unit delivers 140 volts d-c at 20 milliamps, while the low tension circuit delivers 6.0 volts at a current of up to 0.5 amp. Connection to the accumulator is by means of heavy-duty plastic cable (acid resistant) terminated in spring clips.

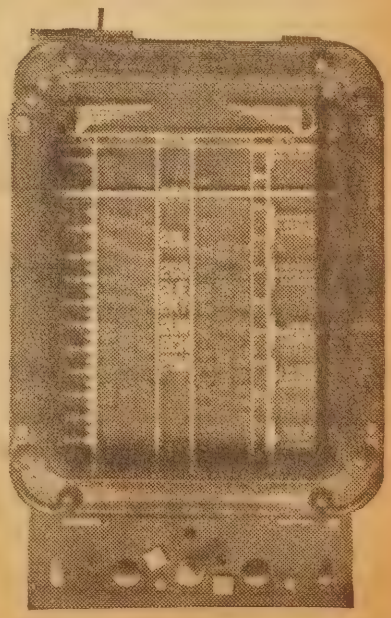
The output connections are terminated in a 6-pin socket on the end of the case. The two filament pins are used for the 6-volt output, while the small pins to either side are for high tension connections. The two remaining pins can be connected through an off-on switch on the receiver proper.

"Vibrapower" is manufactured by Ferguson's Radio Pty. Ltd., of 19 McMahon-st., Willoughby, NSW. The unit is available through radio supply houses.

NEW STRAIGHT-LINE DIALS FROM EFCO.



The dial pictured below is the new SLV-45 unit, specially intended for table model receivers. It measures 4½ inches wide by 8 inches deep, the pointer travelling vertically over the scale. The glass is edge-lit and calibrated in green, orange and white. Local stations are displayed prominently in a centre strip.

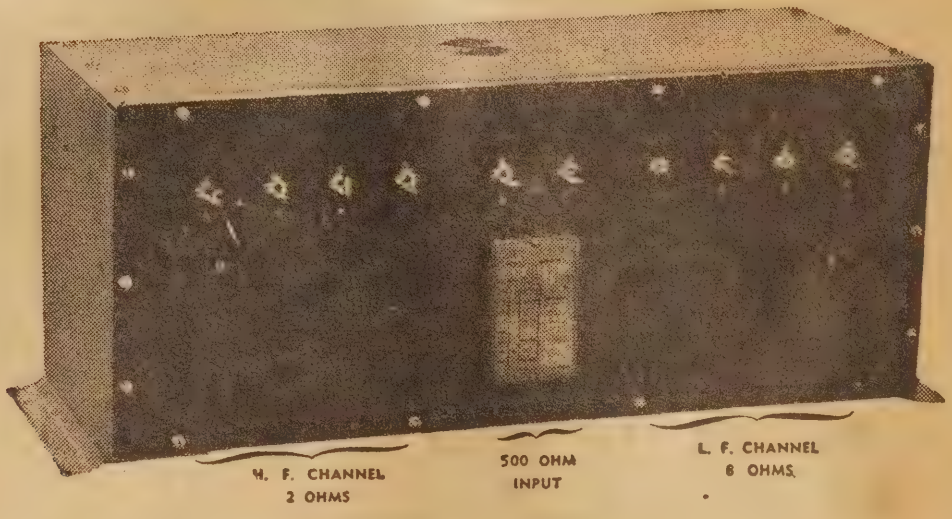


The Efco Manufacturing Company have recently released two dial movements for the new season's receivers. The USL-46 dial, shown above, replaces the older USL-41 and is intended for use in large console receivers. It measures approximately 12in. wide by 8in. deep and employs a cord drive with a flywheel on the tuning spindle. Three alternative mounting positions are provided for the spindle to permit variations in panel layout. The dial employs a single edge-lit glass, with calibrations in white, cream, orange and red. Alternative glasses are available which display prominently the stations in each capital city. The escutcheon plate has been completely redesigned and has a pleasing rounded finish at each end. It is calibrated for the Stromberg "H" type gang.

RED LINE

EQUIPMENT

FREQUENCY DIVIDING NETWORKS



GENERAL

Type D482 is specifically designed for High Fidelity radio gramophones and small talking picture sound installations. The unit consists of a shunt type cross-over network using high "Q" inductances and is intended for insertion in a 500 ohm line. Loud speaker input transformers are incorporated in the unit, the voice coil winding being brought out for each channel to 4 terminals for connection either in series, for conventional operation, or in parallel for use with loading resistances for medium and high power circuits with wide range characteristics such as the "Full Frequency Range Amplifier"* This latter method will present what is virtually a constant load to the output tubes with an extremely high damping factor and lead to a marked improvement in transient response.

** Reprints of the articles describing design and construction of this amplifier are available in pamphlet form from:—*

SPECIFICATIONS

OPERATING LEVEL: Plus 39 db max. INSERTION LOSS: Approximately .5 db. CROSS-OVER FREQUENCY: 500 cps. ATTENUATION: Low frequency channel—20 db at 1200 cps. High frequency channel—20 db at 150 cps. INPUT IMPEDANCE: 500 ohms. OUTPUT IMPEDANCES: Low frequency channel—8 ohms. for 1 "Rola" Type G12. High frequency channel— 2 ohms. for 1 "Rola" Type 8M (if parallel connected, output impedances will be 2 ohms and .5 ohms and require to be shunted with resistances of 2.67 ohms and .66 ohms respectively.) FREQUENCY RESPONSE: (Both Channels.) Within 1 db from 30 cps. to 12,000 cps. WEIGHT: 18lbs. SIZE: 13 x 5½ x 5.

List Price: £10/10/-

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A GUARANTEE OF DEPENDABILITY

NEW LINE OF TUNING COILS

Marketed under the trade name of "Q Plus," a new line of tuning coils is announced by R. W. Steane and Co. Pty. of Melbourne.

THE coil in the centre is a broadcast aerial coil. It is wound on a ⅜in. diameter former, with high impedance primary and three-pie grid winding. No iron core is used, but high performance is claimed.

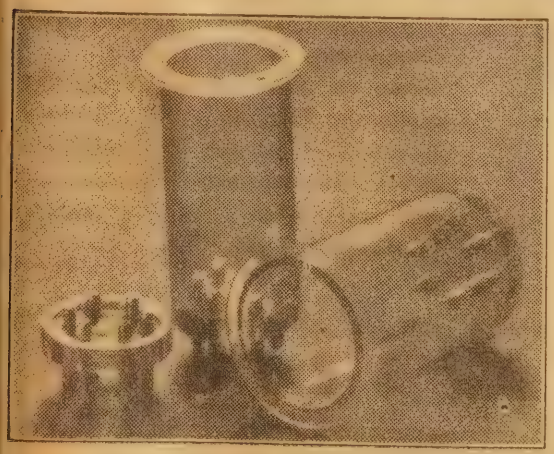
It is planned to make available oscillator coils to suit all popular converter valves. The coils employ single-hole mounting and are intended for use without shield cans.

Of special interest is the midget broadcast oscillator coil, pictured on the left. It is designed for the 1R5 converter and is intended for midget portable receivers, in conjunction with a loop aerial marketed by the same company. The coil is wound on a third-watt resistor, the oscillator grid resistor and coil being wired straight into the circuit.

"Q Plus" coils will be marketed through usual trade channels. R. W. Steane Pty. Ltd. are located at 143 High-street, Kew, E4, Victoria.

MOULDED FORMERS FROM RCS

Moulded in low-loss trolitul, a series of coil formers manufactured by RCS Radio Pty. Ltd. will be of special interest to amateurs.



THE formers are 2¼in. long and are to be marketed in diameters of 1in., 1¼in., and 1⅜in. A flange around the top facilitates withdrawal from the socket and has space for marking in the frequency band and type of coil. The coil former base is also to be marketed and is for use with self-supporting coils.

Supplies of these new 6-pin formers will be available through all RCS distributors.

EDDYSTONE S/W COMPONENTS

Well known in Australia before the war, Eddystone short-wave components are once again available on the local market. Typical of these components are the two tuning condensers and the coupler illustrated above. Australian agents are Keith Harris & Co. Pty. Ltd., 51 William-street, Melbourne, C.1.

SOUNDS LIKE A GOOD TIP TO ME... BUT WHAT IS

DUCONOL "A"?

Duconol "A" is a new synthetic treating material used in Ducon Capacitors. Product of many years research, it has supplied a complete answer to capacitor problems.

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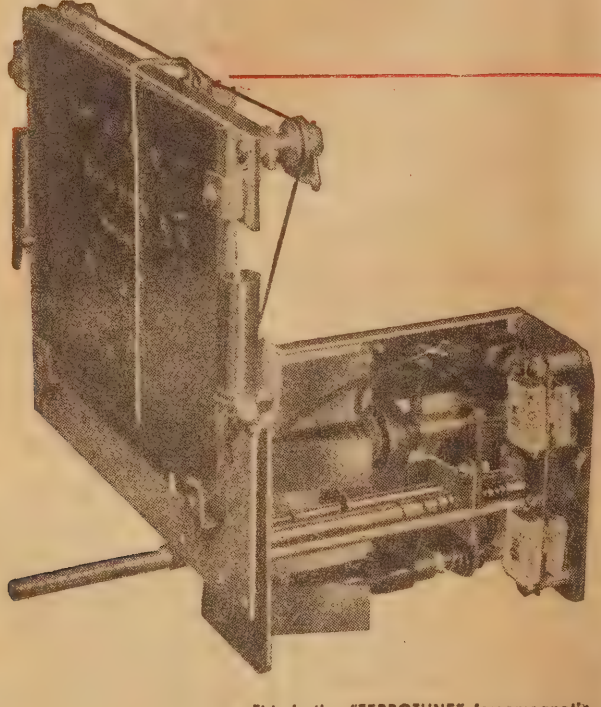
KPT

THE MAGIC OF FERROTUNE



This is the "FERROTUNE" ferromagnetic gangless tuning unit. It covers the broadcast band and includes padding and trimming, tuning mechanism, etc.

WITH the FERROTUNE gangless ferromagnetic tuning unit it is possible to have the optimum of inductance and capacity for every frequency on the broadcast band.

This major contribution is due to KINGSLEY RADIO'S development of the iron-dust core.

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So when you get going on that superhet specify the FERROTUNE gangless tuning unit . . . ask also for KINGSLEY PERMACLAD coils and I.F.'s, iron-core tuned and designed to give greater gain, selectivity, and "Q."

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YOUR HELICOPTER COMES NEARER

Flying with hands off the controls is as simple in Firestone's new helicopter as it is on a bicycle. Exceptional stability of this new aircraft is one of the many outstanding features built into this commercial version of XR-8.

FLYING WINDMILLS MAKE PROGRESS

The new Firestone commercial-type helicopter was flown in its first public demonstration at the 1946 Cleveland National Air Races by Slim Soule, veteran rotary-wing aircraft pilot. Built by the Willow Grove division of the Firestone Aircraft Company, the two-place coupe model is the first commercial-type aircraft announced by Firestone. The helicopter can fly 100 miles an hour speed runs, straight up or down, sideways, backwards, and in every other conceivable attitude, except upside down.

The era of the eagerly awaited non military helicopter is here at last, even though the day of the private fliers' personal helicopter is still in the unpredictable future.

MUCH has been heard of the recent helicopter activities in the USA, and it cannot be denied that the Americans are in the forefront of the new era.

Several major helicopter manufacturing companies in the USA have been granted an approved type certificate by the CAA for the "go ahead" in commercial helicopters.

The Sikorsky S-51 and the Firestone Model GA-45D with many others are now flying.

POSTWAR ACTIVITY

Having postponed, at military request, all work on a commercial version of the designs that proved themselves in various theatres of war from China, India and Burma to England, Labrador and Alaska, the Sikorsky Aircraft Division of the United Aircraft Corporation and the Firestone Helicopter Company of Ohio did not turn their attention to postwar designs until after V-J day.

This handicap in getting into commercial production was mitigated to a large extent by the experience gained as the only quantity producers in the world of rotary wing aircraft for the Army, Navy and the Coast Guard duty.

It is only natural that the Sikorsky S-51, the first 4-place helicopter offered anywhere for commercial use, should be a modification of the two-place military R-5 which established an enviable performance record accomplishing numerous rescues of personnel and breaking all existing records for altitude and speed.

The first aircraft of the S-51 series made its maiden flight on Saturday, February 16, 1946.

This flight was conducted under vastly different conditions than surrounded the first flight of the VS-300 back in 1939, when Igor I. Sikorsky recorded the first successful helicopter flight in the Western Hemisphere and the first successful flight by a single-main-rotor helicopter in the world's history. Mr. Sikorsky at that time had no precedent to guide him.

His kinsman, D. D. Viner, Sikorsky's chief test pilot, last year had completed hundreds of hours of helicopter flight and the craft he confidently "gave the gun" was the newest in a proud line of more than 400 successful helicopters.

by

Boris Carone

Firestone's contribution to the new era is the GA-45D a coupe model helicopter.

This two passenger craft is also a commercial version of one of the US Army Air Force's most successful rotory-wing aircraft, the XR-9B.

First public demonstration of the GA-45D was made on August 30, 1946, on the opening day of the Cleveland National Air Races.

Since this date, the helicopter has been undergoing intensive flight tests, first with a 125 horse-power engine and currently with a 175 hp engine.

Results of this test programme will influence the design of a four-place family-type helicopter soon now being developed by the Firestone Aircraft Company at Akron, Ohio.

Let's take a look at the Sikorsky S-51 as it returns from one of its numerous tests.

It is just 12 feet high and with its three blades extended has an overall length of 57 feet.

CONTROL DETAILS

Now, let's step into the pilot's seat.

In back of the pilot's seat is a wide deeply upholstered seat that accommodates three adults without crowding—affords them the comfort so welcome in a cross-country hop.

Look at the oval instrument panel just low enough to be out of direct forward eye level.

Here are all the flight instruments grouped in one place, yet you can look over them, past them to either side, or below, without difficulty.

The pedestal upon which the panel is mounted is more than just a stand. In orderly array, it presents the necessary buttons, switches, and levers —all in easy reach.

Jacks for radio headsets are located just overhead, to avoid the annoyance of dangling wires.

Rudder pedals, flight directional control and main pitch control are in comfortable location.

The S-51 is a many-purpose vehicle —if mail or other cargo is to be carried, the three-place seat behind the pilot is easily removable.

The carpets may be taken up and racks or bins of the necessary dimensions substituted.

Tanks and special equipment for crop dusting and insecticide spraying are installed, according to the purchaser's desire.

SEEN OVER SYDNEY

(A military version of this craft, on Admiral Byrd's Antarctic Task Force was the first helicopter to hover over Sydney.)

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Already, Frequency Modulation in Australia is well into the experimental stage, while Television and Facsimile are regularly making overseas headlines.

NEW DEVELOPMENTS COMING

Soon—how soon the next year or two will tell—these great developments will also be here in Australia. Then, the radio industry will search eagerly for trained men.

If you adopt a "wait and see" attitude you will certainly find that others more wide awake to opportunity, have securely established themselves in the most lucrative positions by the time you are ready to take your place in the industry.

TAKE THIS STEP

Don't wait and say, "I never had a chance." Instead, seize this opportunity to take your first real step towards a well-paid career. Get the latest information on this up to the minute training.

SOME OF THE SUBJECTS COVERED:

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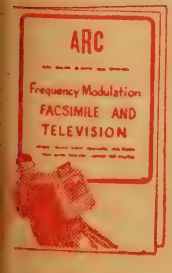

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.....

THE "WAWKUS BIRD" PICTURED IN FULL FLIGHT

The S-51—Sikorsky 4-place Commercial Helicopter.

The Firestone Coupe Model GA-45D, like the S-51, in common with other helicopters, takes off and lands vertically, hovers motionless, flies forward, sideways, and backward.

They are both classed as Group A helicopters. (Single rotor craft with torque-reacting device.)

Since we peeped into the interior of the S-51, let's have a look how the GA-45D is constructed, and how it flies.

The main rotor is an NACA airfoil section, measuring 12.25 inches chord at the root of the blade, and 8.5 inches at the lip of the blade.

Rotor blade surface area is 12.9 square inches, and rotor disc loading is 2.76 pounds per square foot.

At cruising speed, the rotor turns at the rate of 285 rpm.

TAIL ROTOR

The tail rotor also is an NACA airfoil, with a blade area of 1.125 square feet.

Cruising rpm is 1300.

Rotor blades are constructed of step-tapered heat-treated steel tube spars, to which 7/32in. five-ply poplar ribs are attached by stainless steel collars.

Leading edge strips are spruce over the inboard half of the blade and maple over the outboard half, having a lead ballast embedded in them.

Trailing edge tips are made of spruce. Top and bottom surfaces of the skeleton are covered with 1/16in. three-ply mahogany, with poplar core. Blades are fabric covered and doped.

The fuselage is made of welded steel tubing with a nose section of transparent plastic.

Fuselage fairing is aluminium alloy. The boom has a balsa core with alclad outside skin.

The simplified and compact instrument panel has only eight instruments. A transmitting-receiving radio also is standard equipment.

In flight, directional heading is obtained through torque correction from the tail rotor through use of conventional rudder pedals.

Horizonal travel of the ship in any direction is effected by cyclic pitch control from a conventional control stick.

Vertical ascent or descent is obtained by simultaneous pitch control in connection with manual throttle to assure sufficient power and rpm.

PITCH CONTROL

An electric-hydraulic governor, by acting upon the simultaneous pitch control, maintains constant predetermined rotor speed, regardless of throttle condition or power used.

With this arrangement, vertical control is effected by use of the throttle—the governor provides automatic simultaneous pitch control in this case.

Two removable panels on each side of the fuselage provide easy access to the power plant and to the transmission; three additional panels are located in the boom to facilitate inspections and repair work. Two hinged panels under the cabin provide access to control cables, governor, brake cylinder, and instrument lines.

The power plant, as well as the overall length of the GA-45D is considerably less than that of the Sikorsky S-51.

It has an overall height of 8ft. 6½in. and a length of 27ft. 7in.

It is powered by a 175 horsepower Franklin six-cylinder air-cooled engine capable of driving the craft at a to speed of 115 miles an hour—it climb at the rate of 1250ft. per minute.

Fuel capacity of 25 gallons provid a range of 225 miles at a cruising spe of 90 mph.

The S-51 is powered by a Pratt an Whitney Wasp Junior engine of 4 horsepower.

It has a cruising range of approx mately 240 miles—provided by 100 ga lons of petrol, not counting amp reserve fuel facilities.

The S-51 has a service ceiling 13,000ft., hovering of 3500ft. and w climb at the rate of 1200ft. a minu at sea level.

EARLY PERFORMANCE

About four years ago the Unit States record for helicopter altitu was 75ft. and the longest flight w about a mile, set by an early Sikors model.

A few months ago a standard pr duction Sikorsky R-5 (military versi of the S-51) set an international r cord of 21,000ft. and averaged 11 miles an hour to set a new internatio speed record.

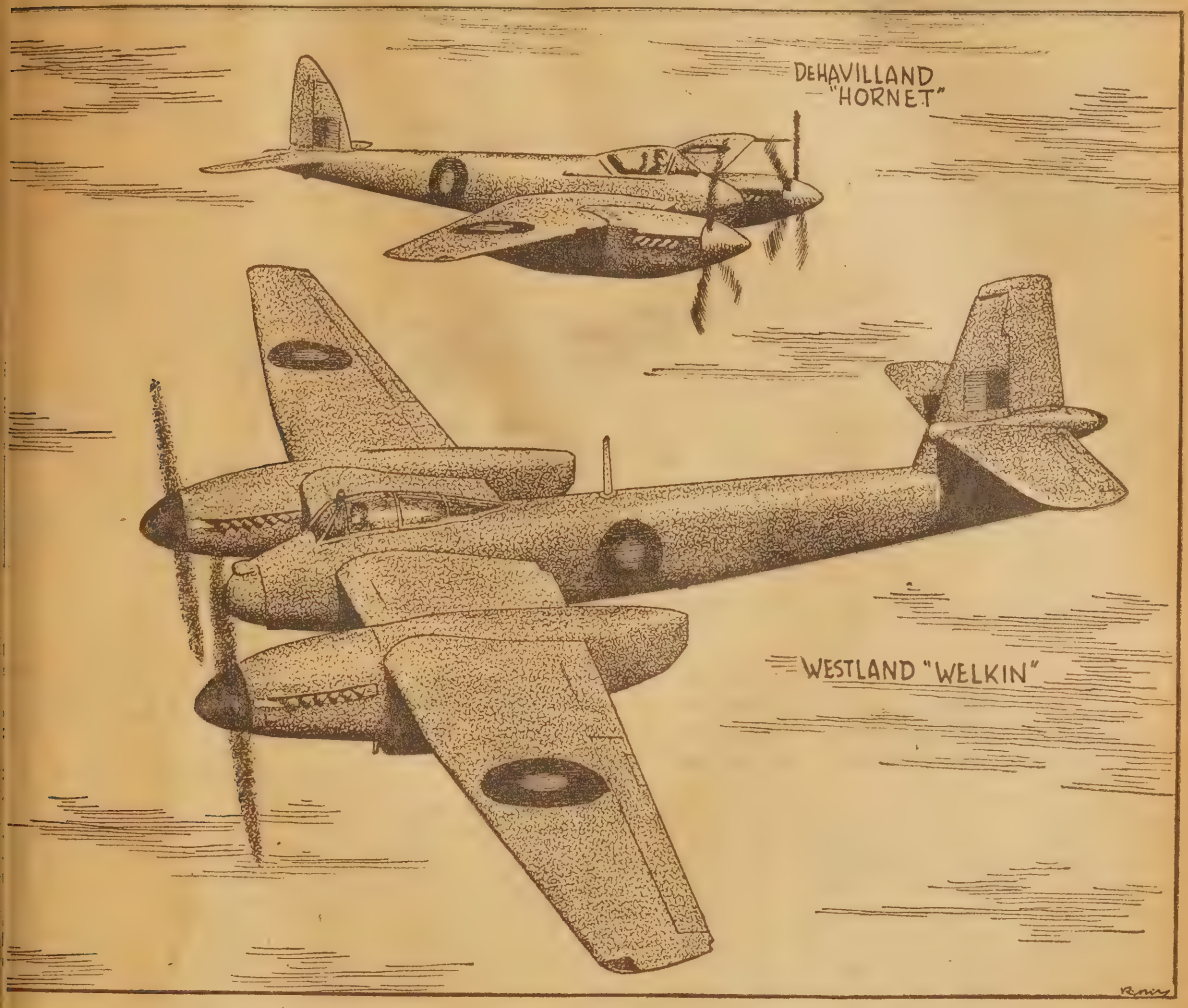
Truly a great step forward in t progress of civil aviation.

TRUE parchment paper is made immersing ordinary good-qual paper for a second or two in str sulphuric acid and immediately aft wards plunging it into a bath of str ammonia. The paper is fina washed. It will be found to h acquired by means of this treatme a horny, tough consistency, v similar to parchment or vellum.

★ ★ ★

Assembly-line techniques appea in the automobile industry in 1 large-scale mass production re began four years later.

WO R.A.F. TWIN-ENGINED FIGHTERS



Two British aircraft designs which show many points of similarity in layout with the famous wartime De Havilland Mosquito are the De Havilland "Hornet" and the Westland "Welkin." Both are in service with the RAF.

ITH a top speed in excess of 470 miles an hour, the Hornet etched above) twin-engined fighter aid to be the world's fastest con- tional propeller-driven aircraft. he plane was developed as a long- ge fighter for operations against an, but the end of the Pacific war ie before it could be brought into rational use.

irtually a scaled-down model of Mosquito, the Hornet can carry ost a ton of bombs or rockets. Arm- nt includes four 20mm. cannon. ge is just under 3000 miles.

MONTH JOB

om the start of the designing , the Hornet was planned, built test-flown in exactly 12 months. owered by Rolls-Royce Merlin en- s of 2070 horse-power each, the net has an operational ceiling of 0 feet. Propellers are of the four-blade full-feathering type.

With a wingspan of 45 feet—nine feet less than the Mosquito—the Hornet is faster, and "cleaner" in line. It was designed as a pure fighter, being a single-seat machine.

The Hornet has the distinction of being the first twin-engined British warplane to operate from an aircraft carrier.

WESTLAND WELKIN

The Westland "Welkin" (lower section of sketch) was designed by a firm which has long specialised in creating aircraft for high flying, and the machine is a stratosphere fighter intended to meet the menace of the high flying raider.

The general layout of the Welkin shows many points of similarity to the earlier Westland Whirlwind, which was also a single-seat twin-engined fighter, but the Welkin is much larger. It is, in fact, the largest single-seat fighter yet built.

Power comes from Rolls-Royce Merlin engines of 1650 horsepower, which drive four-blade constant-speed propellers. The engines are fed with a sufficient quantity of air to maintain performance at great height by two-stage two-speed superchargers.

Normal air pressure is maintained in the cabin of the plane by an automatic control valve. The pilot also has armor protection.

HEATING

The heating device is light and compact and even at temperatures below —70 deg. Fahr., the cockpit is kept so warm that the pilot does not even need special clothing. The temperature can be regulated easily, cool air being admitted at low altitudes.

Speed of the Welkin is about 390 miles an hour, and range is 1500 miles. Armament consists of four 20mm. cannon in the nose.

Dimensions of the Welkin are: Wingspan, 70ft., and length, 41ft. 6in. Wing area is 460 square feet.

GLUES, CEMENTS AND ADHESIVES

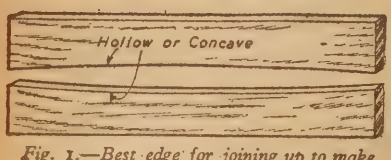


Fig. 1.—Best edge for joining up to make wide boards (exaggerated).

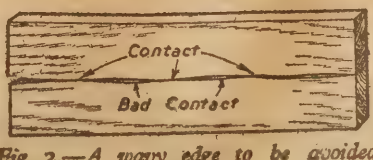


Fig. 2.—A wavy edge to be avoided (exaggerated).

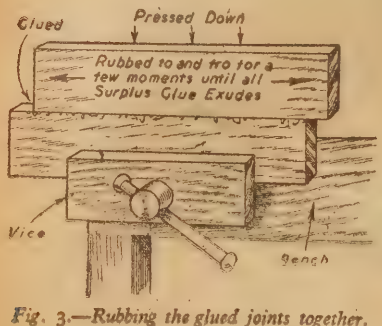


Fig. 3.—Rubbing the glued joints together.

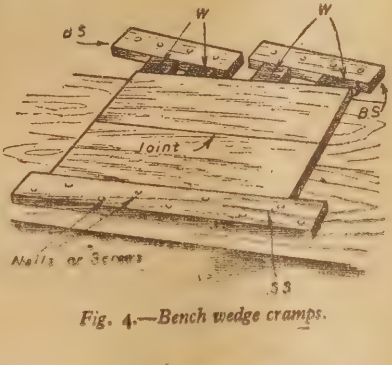


Fig. 4.—Bench wedge cramps.

Glue has been used to our knowledge for more than 3500 years. There are examples of Egyptian furniture showing that the ancient craftsmen employed an animal glue of the same general characteristics as the modern adhesive compound so widely used by all woodworkers.

BESIDES the carpenters' common glue, which is an animal product, requires heating with water, and is a non-waterproof glue, there are many adhesives of a similar nature, some made from fish offal, others from starches and casein. Silicate of soda (waterglass), in which we preserve eggs, is a form of glue used for paper objects. All of these products will be dealt with in the course of these notes.

CARPENTERS' GLUE

This animal glue is in its better qualities made from the hides and hoofs of beasts slain for food, cheaper grades being obtained from the bones. The stuff is akin to gelatine, but it is not strictly correct to say that the latter is simply a more refined and purer kind of glue, although the origin of the two substances is the same.

Carpenters' glue is always used in a heated condition, and it may be said that whenever this glue is heated while dissolved in water, a chemical action occurs. Therefore, if the heating be repeated, the strength quality of the product is adversely affected. The heating is not simply a process of making the glue soft; something else is happening. For woodwork a high grade glue is the most economical, but in making a choice it is not necessary to specify the pure "hide glue"; such glues are strong, but are a little like glass, and prone to break on impact. A weaker but more elastic quality is to be preferred.

A glue which smells badly should not be used. It is most probably partly decomposed through not being made from carefully cleansed raw materials. Further, this cleansing process in the manufacture of glue is important, as all grease should be removed. In Government tests of glue the surface of a dissolved sample is examined for the presence of grease.

TESTING A SAMPLE OF GLUE

It is also notable that glues which are alkaline are more likely to decompose than samples which on a litmus paper test are shown to be slightly acid. This is due to bacterial activities. Therefore, a glue should not readily go mouldy in a damp atmosphere, as this indicates that it has been adulterated with sugar or molasses. Sour glues are also to be avoided, and while a high gloss on the surface is not an indication of the highest quality, a uniform color and uniform surface are desirable factors.

In breaking a sample between the fingers and thumb, an even and easy fracture suggests a low strength a brittleness, but if the sheet bends co siderably before breaking and does with a splintery edge, then it is a gl to be chosen.

There are many tests and testi machines for glues and glued join but they are not altogether satisfacto and if the reader adopts them it wise to take the average of many tri rather than to rely on any single te

If, when a sample of melted glue rapidly stirred a foam appears on surface, then its quality is not go This test may best be performed w an egg-whisk. Good glues should a sorb six times their own weight water and still remain in a jelly for

by "Handyman"

MAKING THE GLUE

The old idea that glue to be a good must be "cooked" for one to th hours has been exploded by scient researches into the nature of anir glues. The same applies to the lo soaking of the cakes before placing the heating pot, so often recommer ed. The glue should be broken up in small lumps and placed in not m than five times its own bulk of cl water, about three or four hours bef it is necessary to use it.

SOAKING GLUE

The soaking of glue too much in vance of its use is liable to start put faction. Perfectly clean water—c tainly not the water out of the i receptacle which in the ordinary pliance surrounds the glue pot essential to success. Any water wh contains iron or lime in excess s ously injures glues. It has been e mated by laboratory tests that imp water will reduce the value of a by one half.

Glue should always be heated such a way that it never gets ho than 150 deg. F.; therefore, to the glue on a gas stove is to absolu spoil it. The above temperatur below the boiling point of water, for amateur purposes an eathernv jam jar containing the glue sta ing in an open saucepan of water not rise much above the required t perature if the heating water is lowed to simmer quietly on a stov fire.

USING GLUE

The operation of "gluing up" sh always be performed in a warm r On several occasions I have ex enced difficulties in applying glu woodwork in my out-of-doors w shop in the depth of winter. In of warming up the job by dabbi with hot water, I have finally ha take the work indoors into the w kitchen to finish it off in a sati tory manner. These difficulties more acute where the job necessi a certain time being spent on cr

g up the joints in their proper posi-ons after the hot glue is applied. If ıe surroundings are so cold that the ue goes into a jelly before the parts re joined up, then it is time to seek me other place to do the job.

For woods with an even grain the st finish preparatory to gluing up that obtained by glasspaper follow-g the use of the plane. In the case materials like oak, chestnut and egon pine, which have a natural ructure of a mixed hardness, a grain ith hard veins in a wood of softer aracter, it is best to leave the sur-ce as it comes from the steel tool. he use of glasspaper is apt to leave ıe surface uneven. It removes the ıfter portion, leaving the hard grain anding up, and a perfectly flat con-ct, which is an essential to a good ue joint, is not obtained.

OINTING WOOD

As wide boards are difficult to ob-in, and in any case are very ex-ensive, woodworkers resort to the glue inting up of narrower pieces of stuff. is very important that such work ıould be well done, otherwise the ening of joints may spoil the ap-arance and usefulness of the fin-hed article. If well done the glue int of this kind is as strong as the ıtural wood.

OINTING UP TO MAKE WIDE OARDS

In jointing a long board, the ideal lge is a slightly hollow one, as indi-ted in the sketch, Fig 1. Cramps of e usual kind will then pull up the int quite tightly.

Under no circumstances should the hooting" of the edges of the boards done so carelessly that a wavy line produced as shown in an exagger-ed manner in the sketch of the two ljacent pieces (Fig. 2). No amount cramping will result in the desired rfect end-to-end contact.

The board, should not be dead cold, ıd with one in the vice, as indicated Fig. 3, the glue should be applied inly over the surfaces to be joined. ıe two parts should then be placed gether and the upper one rubbed into the lower one, all surplus glue exuding in the process. All this must be done quickly, so that the job is got between the cramps before the glue gets into the semi-set or jelly state.

A SUBSTITUTE FOR CARPENTERS' CRAMPS

Where carpenters' cramps are not available and the job is too big to get between the jaws of the bench vice, a good idea is to make a series of wedges on the flat of the bench. One board is made to rest up against a stop strip (SS Fig. 4) nailed to the bench, and at the other side two or more backing strips (BS) (according to the length of the job) are nailed down at an angle with a gap intervening. Wedges (W) are then driven in, as shown in the sketch.

All this must be prepared before the glue is applied, so that there is no loss of time between the application of the glue and the final fixing up in the cramping device.

The power of a wedge when hammered into place is enormous, and, therefore, the backing strips (BS) must be firmly nailed or screwed down to the bench. If there is any danger of the board cockling in the wedging process means must be employed to keep the job flat.

WHITE GLUE

In stopping up a bad place or knot-hole in a plank too small to be filled by a wooden plug, and which has to be finished off in a natural manner, carpenters often resort to a readily made mixture of sawdust, whiting, and hot glue. There is no objection to this mixture, except that zinc oxide in moderation is a better "whitener," having no deleterious effect on the strength of the glue. For a really white glue, which may be necessary in some cases, use a mixture of roughly one of zinc oxide to four of melted glue. This can be kept in a separate pot and can be re-heated as occasion may require, always remembering that even ordinary glue cannot be re-heated indefinitely without suffering in its strength quality.

(To be continued)

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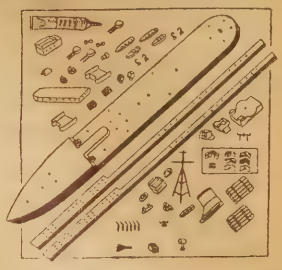

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THE HAM BANDS WITH BILL MOORE

Timed to commence on May 15 and with the various delegations arriving, the International Telecommunications Conference is gradually taking shape.

BEST news of the month from the amateur's viewpoint is that of the final band widths as transmitted to Berne, for inclusion in the proposals from the US Government. Final figures were as follows: 3500 to 4000, 7000-7300, 14,000-14,400 and 28,000-29,700kcs. These are substantially as before, with 300kcs less on the 10MX band. An entirely new band is proposed from 21,000 to 21,500 kcs.

For some time now the ARRL has been apprehensive on the US Governmental proposals, but are rather satisfied with the outcome. The 160-metre band has been lost to Loran for the moment, but a technical committee will investigate the possibility of shared operation.

Canada's proposals are similar to those of the US, except that the 10MX band will remain as before, 28 to 30 mc and the new band will read from 21,000 to 21,450kcs.

The UK's proposals are not as liberal as those of the USA. The following list is not the final one, so there is some hope of improvement. These bands in full harmonic relationship, 3.5 to 3.6, 7.0 to 7.2, 14.0 to 14.4 megacycles, are proposed and the 10MX band from 28.0 to 29.7 megacycles. The new band in the vicinity of 21 megs was from 21.25 to 21.45 megs. Shared operation of 1715 to 2000kcs was also proposed. No band in the vicinity of 5 or 6 metres was suggested and several of the other UHF bands were shaved.

Australia's proposals are as yet not released.

EXPEDITIONS USE AMATEUR RADIO

The Norwegian Ethnological expedition Kon Tiki, using the callsign LI2B, finally left Peru on April 28. Anticipated time for the raft trip is three to four months. Operation will be on the 56, 28 and 14mc bands, power 15 watts. Please inform WIA, FHQ, Box 2611W, GPO, Melbourne, of any contacts with the expedition. Full details were given in a previous issue of R & H.

The Ronne Antarctic research expedition will also use amateur radio for communications. The expedition will be away for about 18 months and will be based on Palmer Island, about 1000 miles south of Cape Horn. W3LYK is the operator and the 28mc band will be used for unscheduled contacts, callsign W3LYK/MM.

AMATEUR POPULATION

The following figures give some idea of the activity of amateurs in various countries:

Argentina: Total amateurs 1040; Australia, 1700; Belgium, 300; Colombia, 87; Cuba, 250; Czechoslovakia, 150; Denmark, 300; Eire, 60; Mexico, 545; Netherlands, 407; Newfoundland, 52; Norway, 150; South Africa, 365; Sweden, 540; UK, 4500; USA, 75,000.

While these figures do not include all the amateurs of the world, there are approximately seven times as many hams within the USA as outside it. No wonder so much of our QRM comes from the States. After all, they do have the advantage of skip over there, while we in Australia at times receive all States at any given time.

QSL PROCEDURE

Stations that do not use the local WIA QSL Bureau for forwarding international cards, should check on the official IARU Bureau list.

Overseas societies are complaining that batches of cards are being received at HQ instead of at the Bureau address, as listed in the IARU notes in QST.

DX AND PERSONAL PARS

Noel, of VR5PL, Box 25, Nukualofa, Tonga reports another VR5 will shortly be on 40MX. An 813 with grid modulation is responsible for VR5PL's telephony on the same band.

The usefulness of Zepps has been pressed by 2TI, but 2AIK is quite happy with a doublet for Europe in the early hours.

2DO will shortly fly a balloon with a 40MX full-wave antenna attached — main problem will be locals with .22's taking practice and believes it will have to be raised at night to avoid such attacks.

The QRM on 20 and 40 MX has shocked quite a few of the old timers making a post war comeback—2JZ, of Singleton, was one. Another VOT said the only thing they didn't talk about these days was wireless (radio).

2AIG describes the 40MX band as the "Business Band," and one doesn't need much converting after a few hours listening to his ideas.

The ionosphere played up fairly badly during the past month. Daylight fadeouts of 1100 hours were fairly common. On April 18 the 40MX band closed up for all contacts within 1000 miles.

The little 10MX telephony contest between 2EP and 2ADT is progressing; believe 2PP is just in front with 61 countries.

2NO mentions on the air a VOT making a comeback in the person of Chas Maclurcan VK2CM—heard Jack Pike, 2JP, will make one day, too.

On the Blue Mountains, 2LY lost his antenna for 6MX and is rebuilding during the lull—2LZ always on the UHF's, does some mobile work on 168mc.

The G's are still workable the long way round on 28mc—about 0700 hours is the time.

Don't get over-enthusiastic about the S9 report from the States. 2VN reports that their standard of reporting is higher than ours—write about 1½ S points off the report to get to our standard. The ZL's stick to about our standards for the RST system.

We had recently a nice rumor of a cancellation of bands below 50mc flash around Australia, bounce once or twice; while amateurs approached M'sP and worried WIA FHQ. The story originated from a VK and it seems wise in the future before passing on such information that confirmation should be sought. We will have plenty of these tales in the future, while the International Telecommunications conference is sitting. We will hear soon enough of our fate, and any rushing of individuals to the authorities will only confuse the issue—sit tight and believe the news when it comes from the official source. The W's have the worries at the moment from the same business.

(Continued on Page 75)

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SHORT WAVE NOTES BY RAY SIMPSON

VINTER CONDITIONS APPROACHING
PEAK RECEPTION ON ALL BANDS

f present conditions are any criterion, this coming winter shows every sign of being an excellent one for reception, as the noise level is decreasing on the lower frequency bands, and the Central and South Americans are breaking through in daylight and even better around 10 pm.

IE 49-metre band, especially at night, abounds with many stations all of which have not as yet been able to identify be- t the fact they are Spanish speaking. Care- tuning in the next few weeks should a number of them down.

READERS' VERIFICATIONS

iring this past month we have received ils of some of our readers' verifications ch they have recently received. In next th's issue we hope to devote some space hese, together with any other informa- we receive, as we think these details of considerable interest. Space is our handicap in all these matters, as e always seems to be more information we have space to publish, and we to try to cater for both the ardent DX and also the other type of listener who nore interested in the BBC and USA ons for entertainment only.

HIS MONTH'S VERIFICATIONS

E following readers have received verifica- ions in response to their reception reports: r. R. Rooke: VLA4, VLG5, VLB9, VLR, IO 9650kc, KWIX 11,890kc, KCBA 15,150kc, 5.

r. C. W. Jones: UNO, KWID/X, Warsaw, 4A, XORA, ETA Ethiopia.

r. M. McShane: VLB3, VLB6, VLB8, VLA4, 9.

r. A. Cushen: Macau 7280, 7520kc, Busto zio 9630, 11,810kc, ZLT10, WLKS, Berlin kc, Leipzig 9730kc, XRAY, KZPI, ZAA, , CHNX, Nairobi 4950kc, WCRC 21,570kc, RX 9670, 6100, 21,610kc, WNRA 7565, 0kc, WNRE 15,280kc, WRCA 6100, WNBI kc, KWID 11,900kc, WRUA 6140, 9570, 5, 11,790kc, WRUS 9700, 9570, 11,790kc, W 11,810kc.

r. F. J. Smedley: VLC4, VLB4, VLG3, 6, VLG5 VLC4, XORA, WLKS.

ss D. Sanderson: OLR4A, Radio Wien.

r. E. Moore: COBL, HP5H, CE1180, HJCX, lo National Espana.

r Own Listening Post: SEAC 9520kc, first rt from Australia, VRR5 12,050kc, first rt from Australia, VLA5, VLB4 VUM2 kc, VUD8 7210kc, VLA10 17,840kc, Noumea kc, CR7BJ 9650kc.

READERS' REPORTS

LETTERS and reports have been received from the following readers during the past month:

Mr. G. Moss, Concord, NSW; Mr. M. McShane, Rozelle, NSW; Mr. H. R. Cox, Cobden, NZ; Mr. G. A. E. Major, Manjimup, WA; Mr. R. Block, Petersham, NSW; Mr. Art Cushen, Invercargill, NZ; BBC, London; Radio Australia, Melbourne; Mr. J. Wiseman, Kew, Vic.; Mr. J. D. Harrington, Cremorne, NSW; Mr. H. Fitzsimmons, Nth Fitzroy, Vic.; Mr. C. W. Jones, Gladesville, NSW; Mr. R. Rooke, Manly, NSW; Mr. A. Lee, Merewether, NSW; Mr. F. J. Smedley, Landsborough, Qld; Miss D. Sanderson, Malvern, Vic.; Mr. E. Moore, Brisbane, Qld.

STATION ADDRESSES

ADD the following addresses to your scrapbook:

HHCM.—Magliore Broadcasting Circuit, 38 Rue Americane, Port-au-Prince, Haiti.

XGOA.—Central Broadcasting Station, Sze Tang Hsiang, Nanking, China.

DHKV.—RCA, Berlin Press Center, APO 755, c/o Postmaster, New York, NY, USA.

XEFT.—Radiodifussora XEFT, Indepensia No. 74, Vera Cruz, Ver., Mexico.

ZBW3.—PMG and Chairman of Broadcasting, Broadcast Studio, Gloucester Building, Hongkong.

SBP.—Foreign Liaisons Department, Radiojanst, Kungsgatan 8, Stockholm, Sweden.

CFCX.—Radio Station CFCX 1231 St. Catherine-street W, Montreal, PQ, Canada.

OIX.—O/Y Yleisradio A/B, Lahden Yleisradioasema, Lahti, Suomi (Finland).

CXA21.—Radiodifussora CXA21, 18 de Julio 965, Montevideo, Uruguay.

TAP.—Radio Station TAP, Press Department, Ankara, Turkey.

Sort Wave notes for the July issue of Radio & Hobbies are due on June 14. In the August issue they are due on July 12. Please send them direct to Mr. Ray Simpson, 80 Wilga Street, Concord West, N.S.W.

NEW STATION LOGGINGS

Call.	KC	Metres	Location	Time Heard
CFVP	6030	49.75	Calgary, Alta. Canada	10.30 pm
XEKW	6030	49.75	Morelia, Mexico	10.0 pm
Kuala Lumpur	6045	49.63	Selangor, Malaya	11.0 pm
CXA3	6075	49.38	Montevideo, Uruguay	8.00 pm
Radio Internacional	6200	48.39	Tangiers	6.15 am
CP38	9540	31.45	La Paz, Bolivia	9.30 pm
VUM2	9590	31.28	Madras, India	9.15 pm
KNBA	9650	31.09	Dixon, Cal. USA	5.30 pm
KCBF	9700	30.93	Delano, Cal. USA	7.00 pm
VLB4	11810	25.40	Shepparton, Vic.	1.00 am
KCBF	11810	25.40	Delano, Cal. USA	4.00 pm
Swiss	11815	25.39	Schwarzenbourg, S'land	5.30 pm
Munich	11870	25.27	Munich, Germany	6.00 am
Swiss	15315	19.59	Schwarzenbourg, S'land	1.00 pm
VLA5	15320	19.58	Shepparton, Vic.	10.00 am
KNBI	17850	16.81	Dixon, Cal. USA	5.30 pm
Brussels	21440	13.99	Brussels, Belgium	11.00 pm
KCBA	21460	13.98	Delano, Cal. USA	8.00 am
KGEI	21490	13.96	Belmont, Cal. USA	11.00 am
KNBA	21630	13.87	Dixon, Cal. USA	11.15 am
KCBF	21740	13.80	Delano, Cal. USA	8.00 am

FLASHES FROM EVERYWHERE

RMS ORION

LISTENERS who may have been tuning around the 48 metre band may possibly have heard some of the transmissions from GYLK, being the transmitter aboard the Orion. We heard it first while it was en route from Sydney to Melbourne, when it came in quite well on 6277kc., contacting Sydney. What was more interesting, however, was a broadcast when the ship was nearing Fremantle, when it was in contact with VIP on 6240kc. Although this, of course, was not a broadcast, being in plain language, anyone who happened to be tuned to these frequenceies could follow every word. It is doubtful, however, whether such a transmission will be verified.

HOLLAND

We have received advice regarding a competition to be conducted by PCJ, which should prove of interest to all short wave listeners throughout the world. Full details are not yet available, but it will take the shape of an essay on the subject, "Can Short Wave Radio Promote World Peace?" The first prize in this competition is a return trip by air to Holland from whatever country the winner resides in, with other worthwhile prizes, such as a de luxe model radiogram, &c. In addition, there will be 100 prizes of miniature Dutch clogs for contestants who do not win any of the major prizes. As soon as we receive further details of this competition, we will publish them in these pages.

BELGIAN CONGO

The Belgian Consulate advises that the following transmissions are now scheduled for Radio Leopoldville in the Belgian Congo, and would appreciate any reports as to reception conditions. OTC1 on 17770kc. is now on from 8.0 pm till 10.0 pm, while OTC2, on 9745kc, comes on at 1.30 am and remains on the air until 2.0 pm. A few weeks ago this latter station was really excellent at our location between 6.30 am and 7.0 am, but at time of writing it is practically inaudible. No mention was made of their other transmitter, OTM3, on 9370kc, though it can still be heard in the session received here around breakfast time. OTC2 may possibly be better strength in the very early hours.

ARGENTINA

We note from the "Universalite" that a very interesting new station is now operating in Tierra del Feuga, located at Usuala, and using a frequency of 14850kc, which is between the 19 metre broadcast band and the 20 metre amateur band. At the time it was heard it opened with a short musical selection at 9.45 am, and after a short session in Spanish, followed by music, closed at 10 am. This station has also been logged at other times in point-to-point communication with other stations. Nothing further is known of it at this time, but it would be well worth while to keep a check on this frequency in an effort to find out more information as to who it is operated by, and if call letters have been heard.

USSR

Readers will perhaps wonder why we do not give more attention to the stations of the USSR, and we would explain that it is solely due to the difficulty of giving anything reliable which would still be in effect by the time our notes were printed. The Russian stations make use of an enormous number of frequencies, and only recently we have noticed them on 17770kc late at night, also on two additional channels in the 19 metre band, 15125kc and 15235kc. Before breakfast there are two stations operating in the 49 metre band, one on 6030kc, and the other on 6120kc, both with the same programme. Someday perhaps they will operate on an established schedule, when we can list them similarly to other stations.

NEW STATION LOGGINGS

BOLIVIA

THIS has always been a hard country to log, and although one or two of their stations have been heard in past years the writer has never managed to get one verified, in fact, Bolivia is the only South American country not yet verified.

We were very thrilled, therefore, to log a new Bolivian station on 9540kc which comes on the air nightly at any time from a few minutes after 9.0 pm. Station opens with a march and then gives call letters and location. The call sounds like CP38, but there is still a doubt about this, though we think it to be correct. The location is definitely La Paz, Bolivia, as this is mentioned many times when they give their call again later in the programme.

The station title is "Radio Municipal," which is given every ten minutes or so. The programme can be followed right up till a few minutes before 10.0 pm, when VLB turns on its carrier.

CANADA

Our next best catch for this past month is CFVP, on 6030kc, in Calgary, Alberta, which can now be heard nightly opening at 10.30. We have tried for over 10 years to log this one in the late afternoons, as it is supposed to be on the air till 5.0 pm, but never with any success. Programme consists of recorded music till 10.45 pm, when the time is given and then a hillbilly session goes on till 11.0 pm. Reception is sometimes spoilt early by the Mexican XEKW, which is on the same frequency.

MEXICO

The Mexican XEKW, on 6030kc, located in Morelia, has been heard at quite good strength on some nights from opening at 10.0. The programme consists of news in Spanish till around 10.20 pm and then recordings till 10.30 pm, when, as mentioned previously, it becomes mixed up with the Canadian CFVP. No English has been heard, but the call in Spanish can easily be recognised.

TANGIER

Although this station has been on the air for some time now it was only recently we logged it just after 6.0 am, when all the announcements are in English. They call themselves "Radio Internacional," and at present are operating on 6200kc on a clear channel.

At 6.15 am a session in French begins and this continues till 6.45 am, when they revert to announcements in Spanish.

GERMANY

While listening on the 25 metre band one morning we found that Munich can now be heard on 11,870kc. It carries the same programme as on 31 and 41 metre band and is quite good level, though a little distorted compared with the other two channels. We heard it first just after 5.0 am and think it continues till 6 am.

SWITZERLAND

We have to thank many of our listeners for word concerning the new Swiss station now operating on 11,810kc. This help is very gratifying, as we had personally not heard the announcement saying it was to be used. It can be heard both in the usual transmission to Australia and New Zealand on Tuesdays and Saturdays, and also a new transmission on Mondays and Thursdays. Another new channel is 15,315kc, heard very well at 1.0 pm to North America.

SELANGOR

The Kuala Lumpur station which has been operating on 6170kc for many months past has now changed its frequency to 6045kc, where it can be heard at about the same strength. The reason for the change is not known, unless they anticipate one of the American stations to re-open on 6170kc in the near future.

U.S.A.

The West Coast Americans have now opened up quite a number of new outlets, most of which we think are quite new, though some of them may have been used during the war years. Those which we think to be new we have listed in the New Station panel, and if any of them have been heard before we ask our readers indulgence. Quite a number of them are not listed in the official list of frequencies we have, so the chances are they really are new.

RADIO AUSTRALIA DEDICATES ITS PROGRAMMES

SINCE its inception, Radio Australia's weekly programme, "Australian DX-ers Calling," has met with a generous response from DX-ers throughout the world.

According to advice just received from the Programme Manager, arrangements have now been made to dedicate these programmes to various overseas DX organisations. The first of these programmes will take place on June 1st, and they will continue each week until August 10. We show below the organisations to whom these programmes are dedicated, the dates, and frequencies to be used. It should be noted that frequencies are subject to alteration, and details will be given in DX programmes from time to time.

BRITISH ISLES AND EUROPE

1900 hours GMT Sundays. VLA8 11760kc, VLC11, 15210kc.

Date.	Dedicated to:
June 1	British Shortwave League, London, England.
June 8	International Shortwave League, London, England.
June 15	Swedish Radio Club (SRK), Stockholm, Sweden.
June 22	Anglo-American Radio and Television Society, Uxbridge, England.
June 29	Danish Shortwave Club, Copenhagen, Denmark.
July 6	Daily Express Radio Club, Plymouth Devon, England.
July 13	Malmo DX Club, Malmo, Sweden.
July 20	CQ Club of Jakobstad, Jakobstad, Finland.
July 27	Jonkoping - Huskvarna DX Club, Jonkoping, Sweden.
Aug. 3	Indiana Radio Society, Karachi, India.
Aug. 10	Ceylon and South India Radio Club, Colombo, Ceylon.

NORTH AMERICA, CANADA, SOUTH AFRICA, AND NEW ZEALAND

0525 hours GMT. VLA5 15320kc, VLB8 21600kc, VLG6 15240kc, VLC9 17840kc.

0020 hours GMT. VLA9 21600kc, VLC9 1784[illegible]

Date.	Dedicated to:
June 1	Radio News DX Club, Chicago, [illegible] USA.
June 8	Universal DX Club, Oaklands, [illegible] USA.
June 15	Newark News Radio Club, New[illegible] NJ, USA.
June 22	National Radio Club, Buffalo, [illegible] USA.
June 29	International Round Table R[illegible] Club, Wanwatosa, Wis., USA.
July 6	Grand National Shortwave Lis[illegible] ers' Club, Fort Wayne, Ind., [illegible]
July 13	New Zealand DX Radio Ass[illegible] tion, Wellington, NZ.
July 20	DX-ers of South Africa.
July 27	New Zealand DX Club, Auckl[illegible] NZ.
Aug. 3	Cleveland Radio Club, Lakew[illegible] Ohio, USA.
Aug. 10	DX-ers of Canada.

Overseas listeners, who report on t[illegible] programmes in sufficient detail, will re[illegible] their verification cards, but, as pointed [illegible] recently by Mr. Robin Wood, the Progra[illegible] Manager, a higher standard of report [illegible] be submitted, as they have received some [illegible] poor ones during the past few weeks.

Here are some examples of recent re[illegible] received: "I am collecting verification c[illegible] from different stations. Will you please[illegible] kind enough to send me your verifica[illegible] card." "I heard your station VLA4 on 17[illegible] on October 27th, you played 'Dinah'; [illegible] verification card much appreciated." Wood states that they will be unabl[illegible] continue to issue verification cards if a [illegible] ter standard of report is not submitted.

We know all overseas listeners who [illegible] these pages will co-operate by sending in r[illegible] ports which are really worth while, and [illegible] taining sufficient information to enable [illegible] station to verify their report.

VERIFICATION FROM VRR5 JAMAIC[illegible]

READERS will remember last month we reported reception of VRR5 on 12050kc in Kingston, Jamaica, when they were broadcasting a commentary on the cricket match between Jamaica and Barbados.

We are now pleased to state that we have received a very nice letter of verification by air mail sent by the senior engineer, Mr. B. C. Stone. As it is a very interesting letter we quote some extracts below.

"We are very grateful for your letter of 30th March, reporting reception of our transmission of VRR5 12050kc. on the 29th. From your description of the programme there is no doubt that it was our transmission to which you were listening.

"We were at the time re-broadcasting the local Jamaica broadcasting station, ZQI, which operates on 4.7 mc/s during the day.

"As you say, the programme was a cricket commentary on one of the inter-colony cricket matches, Jamaica v. Barbados, and we were re-transmitting ZQI mainly for listeners in Barbados, but are, nevertheless, extremely pleased to hear of your reception in Australia.

FIRST REPORT

"To the best of my knowledge, yours is the first report from Australia that we have had on broadcasting on this frequency and from this transmitter and you may justifiably add us to your list of first reports.

"The transmitter is a Marconi SWB8E and our output power at the time was about 2.5 kw. As we are not doing regular broadcasting at present, but only special events, we cannot say when to expect to hear us again, but hope you will do some time."

In addition to his letter, Mr. Stone sent us an article which he wrote for "Radio News," and as it, too, is of interest, we give some extracts as follows:—

"ZQI, the local broadcasting station of Jamaica, British West Indies, is situated on the outskirts of Kingston, and has [illegible] on the air since 17th November, 1939. [illegible] operates at present on 4.7 mc/s from 7[illegible] till 8.30 am (EAST) and on 2.33 mc/s [illegible] 10.30 am till 1 pm. The transmitter [illegible] built locally, mostly with American-[illegible] equipment, the final stage power bein[illegible] present about 1200 watts.

"The station is operated by the Jam[illegible] Government, under the management of [illegible] Denis Gick, who has had considerable b[illegible] casting experience also in Canada and [illegible] USA. Programmes consist mainly of [illegible] bulletins (world and local), cultural t[illegible] and entertainment, including BBC and [illegible] Armed Forces transcriptions and local [illegible] tertainers. In addition, during the [illegible] two years ZQI has branched out into [illegible] side broadcasts' with success, and the p[illegible] of Jamaica, very keen on sport, have [illegible] treated to excellent commentaries on l[illegible] colonial cricket and football matches.

WIDE RECEPTION

"These running commentaries were [illegible] broadcast by the co-operation of Cable [illegible] Wireless Ltd. in Jamaica over their s[illegible] wave station at Stony Hill.

"Not only Trinidad listeners found int[illegible] in these broadcast commentaries, for f[illegible] able reports on reception of these t[illegible] missions have since come in from the [illegible] England, Sweden, and South Africa. [illegible] can now add Australia). In view of t[illegible] success of these programmes, it is hoped t[illegible] similar broadcasts will be made during [illegible] forthcoming visits of Barbados and [illegible] cricket teams to Jamaica."

Listeners should now look out for [illegible] station when the MCC reach Jamaica, [illegible] we feel sure Mr. Stone will verify all [illegible] rect reports if sent to him addressed [illegible] and Wireless (WI), Ltd., Wireless Tran[illegible] ting Station Branch, Stony Hill, Jam[illegible] BWI.

INDIA

The Madras station is now using a new frequency of 9590kc for their short wave transmitter VUM2, and it can easily be logged till closing at 9.30 pm. The programme is in English, which gives good material for making out a report.

URUGUAY

One of the loudest South Americans we have heard is CXA3, on 6075kc, which can now be heard nightly opening at 8.0, when the signal is excellent. This station is lo[illegible] in the capital, Montevideo, and the first [illegible] hour of the programme consists of m[illegible] recordings with announcements between [illegible] No difficulty should be found in ident[illegible] this one, as the call is given about five [illegible] times in the first half-hour. CXA-2[illegible] CXA3 onda corta. From 8.30 pm till [illegible] 9.0 pm news in Spanish can be heard [illegible] still at very good strength. This statio[illegible] first reported by Art Cushen in New Z[illegible] at the end of last year, but we have h[illegible] reports on it from Australian listeners a[illegible] but feel sure by next month others will [illegible] found it.

OVERSEAS S.W. STATIONS NOW AUDIBLE

The following stations have actually been heard in this country during the past month and the majority should be audible on a sensitive receiver. All times are Australian Eastern Standard Time.

ENGLAND

B. 9510kc. 31.55m. India and Ceylon. 1 am to 2 pm; East Africa, Near East, c., 2.15 pm to 4.45 pm, 4.15 am to 7 am; taly, 4.15 am to 8.45 am; South America, am to 1.15 pm.

C. 9580kc. 31.32m. Central and South merica, 9.15 am to 11.30 am; Near and liddle East, 5.30 am to 6.30 am, 7 am to .15 am.

D. 11750kc. 25.53m. SW Pacific, 3 pm 4.15 pm; India, Ceylon, Burma, 11.0 am 4.15 pm; Africa, 2 pm to 6 pm, 3.15 am 8.45 am; South America, 9 am to 1.15 m.

E. 11860kc. 25.30m. Central and South merica, 9 am to 1.30 pm.

F. 15140kc. 19.82m. India and Ceylon. pm to 8 pm; South America, 7.15 am to 15 pm.

G. 17790kc. 16.86m. Australia, 3 pm 7 pm; India and Ceylon, 11.30 pm to 30 am, 2 am to 2.45 am; China and apan, 9 pm to 10.15 pm.

H. 21470kc. 13.97m. India, Ceylon, 7 m to 3 am; East and West Africa, 7 pm 5.30 am.

I. 15260kc. 19.66. North America 7.15 m to 11.15 am; North America, &c., 7 m to 7 am.

J. 21530kc. 13.93m. North America, 1 m to 8 am; Iraq and Persia, 7 pm to 2.45 am.

K. 26100kc. 11.49m. East Africa, Central and South Africa, and West Africa, 15 pm to 3 am.

L. 6110kc. 49.10kc. East Africa, Near ast, Austria, 2 pm, 5.15 pm.

M. 11820kc. 25.38m. Australia and NZ, pm to 7 pm; Africa, 3.30 am to 7 am; S. merica, 9 am to 11.30 am.

O. 15180kc. 19.76m. East Africa, 2 pm 7 pm, 2.15 am to 6 am; Mediterranean ea, 5 pm to 5.30 am; W. Indies, 7.15 am 1.15 pm.

P. 15310kc. 19.60m. N. China, 11.30 m to Mid.; Near East, 4 am to 7 am; N. merica, 7.15 am to 12.45 pm; Near East, 45 pm to 3.30 pm, 7 pm to 7.30 pm; N. hina and Japan, mid. to 1.15 am; South merica West Indies, 8 pm to 10 pm.

Q. 21550kc. 13.92m. India and Ceyn, 11.30 pm to 1.30 am, 2 am to 2.45 n; SW Pacific, 4 pm to 7 pm.

R. 17810kc. 16.84m. N. China, India, eylon, 7 pm to 3 am; East Africa, 7 pm 6 am; C. and W. Africa, 2.30 pm to pm.

S. 17715kc. 16.93m. W. Indies and C. nerica, 8 pm to 11.15 pm.

T. 15450kc. 19.42m. NZ and Pacific, pm to 7 pm; C. and S. America, 8 am 11.30 am.

U. 12095kc. 24.80m. C. America, 9 am 11.30 am; East Africa, 2 pm to 5 pm, am to 7 am; Mediterranean, 4 pm to 7 n.

V. 9825kc. 30.53m. N. America, 9.30 n to 12.45 pm, 12.45 pm to 2 pm.

W. 9410kc. 31.88m. S. America, 9.15 n to 1.45 pm.

X. 6180kc. 48.54m. N. Africa, 2.45 n to 3.15 pm.

Y. 18130kc. 16.55m. N. America, 11 pm mid., 12.15 am to 1.15 am, 5.45 am to .15 am; Mexico, &c., mid. to 12.15 am; America, 8 pm to 11 pm.

Z. 18025kc. 16.64m. NZ and Pacific, 5 pm to 7 pm; Near East, 8 pm to 11 n; Africa, 2 am to 8.45 am.

1. 9915kc. 30.28m. S. America, 9 am 11.30 am; N. Africa, 5.30 am to 6.30 n; N. China, 2 pm to 3.30 pm.

2. 12040kc. 24.92m. S. America, 9 am 1.30 pm; Near and Middle East, 2.45 n to 3.30 pm, 1.45 am to 4.15 am, 4.30 n to 5.15 am, 5.30 am to 6.30 am, 7 am 7.15 am.

3. 9690kc. 30.96m. Australia, 3 pm to pm.

4. 9600kc. 31.25m. C. and S. Africa, am to 7 am; Central America, 9 am to 5 pm; N. Africa, 2 pm to 4 pm.

5. 21640kc. 13.86m. Burma Malaya, pm to mid.; Africa, 1.30 am to 3.30 n, 4 am to 7 am.

6. 18080kc. 16.59m. C. and S. Africa, 0 am to 7 am.

7. 17700kc. 16.95m. Burma and Malaya, om to mid.; Central and S. America, 8 am to 9 am; W. Indies, 12.15 am to 2.15 am.

GVQ. 17730kc. 16.92m. S. America, 8 am to 9 am; Near and Middle East, 2.45 pm to 3.30 pm; Iraq and Persia, 4 am to 7 pm, mid. to 5.30 am.

GVR. 21675kc. 13.84m. Central America, 1.30 am to 1.45 am, 2 am to 2.30 am; W. Indies, 3 am to 8.45 am.

GVS. 21710kc. 13.82m. Australia, 3.45 pm to 7 pm; South America, 9 pm to 1.15 am, 2 am to 8.45 am.

GVT. 21750kc. 13.79m. S. America, 1.30 am to 1.45 am, 2 am to 2.30 am; N. China and SW Pacific 5 pm to mid.

GVU. 11770kc. 25.49m. N. Africa, 8.45 pm to 9 pm.

GVW. 11700kc. 25.64m. Mexico, 9 am to 1.30 pm.

GVZ. 9640kc. 31.12m. NZ and Pacific, 3 pm to 7 pm; Mexico, 9 am to 1.45 pm; Iraq and Persia, 4 am to 5.30 am; Austria, 3.15 am to 7 am.

GWC. 15070kc. 19.91m. Mexico, 9 am to 1.30 pm; South America, 8 am to 1.30 pm.

GWE. 15435kc. 19.44m. Iraq and Persia, 2 pm to 4.45 pm.

GWG. 15110kc. 19.85m. C. America, 9 am to 1.30 pm; Near and Middle East, 1.45 am to 4.15 am; N. China and SW Pacific, 2.30 pm to 6 pm.

GWH. 11800kc. 25.42m. N. America, 9 am to 12.45 pm, 12.45 pm to 2 pm.

GWL. 7210kc. 41.61m. East Africa, 2 pm to 3.30 pm.

GWN. 7280kc. 41.21m. Austria, 4 am to 7.15 am.

GWO. 9625kc. 31.17m. N. America, 10.15 am to 12.45 pm, 12.45 pm to 2 pm.

GWR. 15300kc. 19.61m. N. Africa, 3 am to 4.15 am.

AFRICA

JOHANNESBURG. 4895kc. 61.29m. South Africa. This one can now be logged right up till closing time of 7.5 am.

CAPETOWN. 5880kc. 51.00m. South Africa. Another of the SABC stations heard till closing at 7.5 am.

JOHANNESBURG. 9875kc. 30.38m. South Africa. When conditions are good, this one is audible till closing at 2.10 am.

ALGIERS. 6040kc. 49.66m. Algeria. Comes in fairly well at 7 am, but not as good as the 25-metre band outlet.

ALGIERS. 11765kc. 25.50m. Algeria. This station can easily be followed at breakfast time on a good morning.

ADDIS ABABA. 9620kc. 31.20m. Ethiopia. Have again logged this African with church service in English Monday till 2 am.

TANANARIVE. 9690kc. 30.96m. Madagascar. Not very loud at our location, but heard around 2.30 am.

DAKAR. 11715kc. 25.60m. Senegal. An excellent signal from this station daily from opening at 5.15 pm. Now also used in morning and heard closing at 8 am.

OMDURMAN. 9660kc. 31.06m. Sudan. Have only heard this Sudanese on two occasions just before 5.30 am.

CNR3. 9080kc. 33.04m. Rabat, French Morocco. Much better now in the early morning.

SUX. 7860kc. 31.15m. Cairo, Egypt. This is an early morning station and heard quite well around 6 o'clock.

FZI. 6025kc. 49.80m. Brazzaville, French Equatorial Africa. News in English heard quite well at 6.45 am.

FZI. 7000kc. 42.86m. Same location. Another outlet of this station heard at the same time.

FZI. 9440kc. 31.80m. Same location. This outlet is always rather weak at our location in the mornings.

FZI. 9980kc. 30.10m. Same location. Louder than the one on 9440kc on most days.

FZI. 11970kc. 25.05m. Same location. Really an excellent one both at 6.30 am and 4 pm.

FZI. 17845kc. 16.81m. Same location. Another good outlet heard during the afternoons.

OTM3. 9370kc. 31.98m. Leopoldville, Belgian Congo. This station can be heard any morning around 7.

OTC2. 9745kc. 30.82m. Same location. Schedule seems to be changed and now heard opening strongly at 8 am.

VQ7LO. 4950kc. 60.61m. Nairobi, Kenya. This station has again been heard back on its old frequency.

CR7BG. 4910kc. 61.09m. Lourenco Marques, Mozambique. Reported from WA as heard at 1.30 am, but not heard at our location.

RADIO INTERNATIONAL. 6200kc. 48.39m. Tangiers. This is the new one heard in English from 6 am.

SOUTH AMERICA

YV1RX. 4800kc. 62.50m. Marcaibo, Venezuela. Still very weak, but audible when it opens around 8.30 pm.

YV1RL. 4810kc. 62.33m. Marcaibo, Venezuela. Another one from this country slightly louder at the same time.

YV5RN. 4915kc. 61.04m. Caracas, Venezuela. Still the loudest one from Venezuela around the same time.

YV5RM. 4970kc. 60.36m. Caracas, Venezuela. Not quite sure of this one, but it is Spanish speaking at 9 pm.

CE622. 6220kc. 48.23m. Santiago, Chile. This one seems to be irregular, but when on the air is fair at 10 pm.

CE960. 9595kc. 31.27m. Santiago, Chile. Very good indeed at 9.30 pm, and have also heard it on Sundays at 3.15 pm.

CE970. 9720kc. 30.86m. Valparaiso, Chile. Have heard this Chile station weakly around 11 pm.

CE1180. 11990kc. 2502m. Santiago, Chile. Still being heard well around 10 pm.

CE1190. 11900kc. 25.21m. Valparaiso, Chile. Only a weak signal from this one, but usually heard around 9.45 pm.

LRM. 6180kc. 48.54m. Mendoza, Argentina. This station also seems irregular, and is only occasionally heard after 8 pm.

LRY. 9455kc. 31.73m. Buenos Aires, Argentina. Quite good on Sundays from about 9.30 pm.

HCJB. 9958kc. 31.12m. Quito, Ecuador. Always heard at quite good level around 10 pm.

HCJB. 12450kc. 24.11m. Same location. Another of the same stations heard both in early morning and at night.

HCJB. 15115kc. 19.85m. Same location. Have heard this one on some mornings around 7 am.

CAX4J. 9340kc. 32.12m. Lima, Peru. This one has been heard on Sundays till as late as 4.30 pm.

HJFK. 6108kc. 49.12m. Pereira, Colombia. This old-timer is again being heard opening at good strength at 10 pm.

HJDE. 6145kc. 48.82m. Medellin, Colombia. First time we have heard this one and it is on from about 9.30 pm.

CP38. 9540kc. 31.45m. La Paz, Bolivia. This is the new one reported this month and heard well when it opens after 9 pm.

CXA3. 6075kc. 49.38m. Montevideo, Uruguay. Another new one heard this last month at our location. Audible 8.30 pm.

USHUAIA. 14850kc. 20.20m. Tierra del Fuega, Argentina. Miss Sanderson has now heard this one weakly at 9.15 am.

CENTRAL AMERICA

TGWA. 9760kc. 30.74m. Guatemala City, Guatemala. This one has been again logged at 2.30 pm on Saturdays.

TGWA. 15170kc. 19.78m. Same location. Much better strength from this outlet when it comes in well around midnight.

TIPG. 9618kc. 31.20m. San Jose, Costa Rica. Really excellent some nights opening at 10 pm and has also been heard at 7 am.

HH3W. 10130kc. 29.62m. Port-au-Prince, Haiti. Rather weak at our location, but heard at better strength interstate.

HHCM. 6160kc. 48.70m. Same location. We have only heard this one ocasionally, but also reported from interstate as heard 10 pm.

HP5A. 11695kc. 25.65m. Panama City, Panama. Irregular, but can sometimes be logged after 10 pm.

HP5J. 9605kc. 31.23m. Same location. The loudest Panamanian we have heard recently and excellent sometimes at 10 pm.
HOXA. 15100kc. 19.87m. Same location. Have only heard this once loud station, but reported by other listeners.
HI1Z. 6315kc. 47.50m. Ciudad Trujillo, Dominican Republic. The Sunday night lottery drawing can still be heard at 9.30.
COCX. 9270kc. 32.36m. Havana, Cuba. The most consistent Cuban and often heard after 10 pm.
COBZ. 9030kc. 33.22m. Havana, Cuba. On Sunday, 27th April, "Radio Salas" was heard at very good level till as late as 5.30 pm.
COHI. 6450kc. 46.57m. Santa Clara, Cuba. A real old-timer and still coming in well around 10 pm.
TG2. 6620kc. 45.32m. Guatemala City, Guatemala. Coming in very well now from opening time of 10 pm.
HP5H. 6122kc. 48.99m. Panama City, Panama. This station also opens at 10 pm, and is really good at that time.
COBQ. 9220kc. 32.31m. Havana, Cuba. Miss Sanderson is hearing this one with a good signal at 8.30 am.

INDIA & ASIA

KZRH. 9640 kc. 31.10m. Manila, Philippine Islands. A very good station now every night, with some interesting programmes.
KZPI. 9710kc. 30.90m. Same location. Moved to 9695kc. for a short time, but is now back on 9710kc. at better strength.
VUM2. 9590kc. 31.28m. Madras, India. New outlet in use, and heard with programme in English till closing at 9.30 pm.
VUD2. 4960kc. 60.48m. New Delhi, India. Quite a nice signal when it comes on the air at 9.30 pm.
VUD3. 6110kc. 49.10m. Same location. This one opens up at 11.0 pm, and is good level at that time.
VUD4. 9670kc. 31.02m. Same location. Another of the Delhi outlets heard at fair strength around 11.0 pm.
VUD5. 9590kc. 31.28m. Same location. After midnight you can hear this one very well.
VUD7. 15160kc. 19.79m. Same location. One of the loudest of the many Delhi outlets every night.
VUD8. 21510kc. 13.95m. Same location. Can be heard well in the afternoon, and also later.
VUD9. 11870kc. 25.27m. Same location. Always a loud signal from this 25-metre band outlet at night.
VUD10. 17830kc. 16.83m. Same location. Usually a fairly loud station when not interfered with by the American.
VUD11. 15290kc. 19.62m. Same location. In the late afternoon and evening comes in very well.
VUB2. 9630kc. 31.15m. Bombay, India. This Indian station can be logged on most nights till closing at 7.0.
VUC2. 6010kc. 49.92m. Calcutta, India. You can hear this one at 9.0 pm, but is badly jammed by Tokio.
VUC2. 3305kc. 90.77m. Same location. If your receiver will tune up here, listen for this outlet at 11.30 pm.
JKD. 6015kc. 49.88m. Tokio, Japan. Quite a good station nightly, when it gives the usual type AFRS programmes.
JKE. 4860kc. 61.73m. Same location. Used in parallel with JKD, and at our location is much louder.
ZBW3. 9515kc. 31.53m. Hongkong. Has improved a little since last month, but still a poor quality signal in English at 9.15 pm.
Kuala Lumpur. 6045kc. 49.63m. Selangor. This station is now using this frequency instead of the old one of 6170kc.
JCKW. 7220kc. 41.55m. Jerusalem, Palestine. Heard this one on one occasion at very good strength till closing at 7.0 am.
CR8AA. 9230kc. 32.43m. Macau, Portuguese China. Still a poor signal, but can be heard nightly.
YHN. 11000kc. 27.27m. Jokjakarta, Java. Always a loud signal from this Indonesian station nightly.
Singapore. 4825kc. 62.18m. Malaya. In the early hours, just after midnight, this Malayan station can easily be logged.
Singapore. 11735kc. 25.56m. Malaya. Another Singapore station, which is rather difficult to hear on some nights.
WLKS. 6105kc. 49.14m. Tokio, Japan. This BCOF station is still being heard interstate until closing at 8.0 pm.
Batavia. 9550kc. 31.41m. Java. Has improved a little since last month, and is quite good now at night with musical items.
Saigon. 6195kc. 48.43m. French Indo-China. This channel is now very much louder than the one on 11780kc.
XORA. 11690kc. 25.66m. Shanghai, China. Listen to this one at 8.0 pm, when they give the news in English.
XGOA. 9730kc. 30.82m. Nanking, China. Has improved a lot, and easily followed from 9.30 pm, with programme in English.
XMTA. 12210kc. 24.56m. Changsha, China. Programme seems to be entirely in Chinese but can be heard nightly.
Macassar. 9360kc. 32.00m. Celebes. This station has a fine library of recordings, and now is heard well around 10.0 pm.
PLY. 10060kc. 29.79m. Bandoeng, Java. This Java station is coming in well around 9.0 pm.
PMC. 18130kc. 16.56m. Bandoeng, Java. Heard by Miss Sanderson calling Amsterdam at 8.30 pm.
Asharq al Adha. 11720kc. 25.60m. Jaffa, Palestine. Now being heard surprisingly well till after 6.0 am.
HS8PD. 5990kc. 50.08m. Bangkok, Siam. If you tune this one in around 9.30 pm you will hear announcement in English.
Rangoon. 6040kc. 49.67m. Burma. This is the only channel we hear now from Burma, and is never interesting at night.

EUROPE

Radio Andorra. 5980kc. 50.02m. Improving a little again, and is now easily followed in the early morning.
Radio Milan. 9630kc. 31.15m. Italy. Some very good musical programmes heard from this one in early morning.
Luxemburg. 6090kc. 49.26m. This station can again be heard breaking through in early morning.
Leipzig. 9730kc. 30.83m. Germany. This one can be heard at 6.30 am, and also in the late afternoons.
Warsaw. 6114kc. 49.18m. The news given in English can be heard daily at 7.0 am.
Madrid. 9370kc. 32.00m. Spain. Musical numbers, and then the news in French heard around 7.0 am.
Munich. 6170kc. 7290kc, 9540kc, 48.62m., 41.15m., 31.45m. Germany. Excellent on all three outlets at 7.0 am.
Sofia. 9330kc. 32.10m. Bulgaria. "Radio Rodina" is still being logged with the news in English at 6.30 am.
Brussels. 17845kc. 16.82m. Belgium. Never very loud at our post, but often heard late at night.
Azores. 7017kc. 42.76m. This one is a good catch, and can be heard daily till closing with clock striking at 7.0 am.
Moscow. 17820kc. 16.82m. USSR. This is a good station in the forenoon, and news in English audible at 9.15 am.
Moscow. 21220kc. 14.13m. USSR. Miss Sanderson reports this one at good strength at 7.30 pm.
CSX. 6365kc. 47.15m. Lisbon, Portugal. Not a loud signal, but easily audible in the early morning.
CSW6. 11040kc. 27.17m. Same location. This is a really good station in most locations at 5.30 am.
LKQ. 11735kc. 25.57m. Frederickstad. Quite a nice signal from this Norwegian around 6.0 am.
LLI. 6185kc. 48.51m. Same location. Used in parallel with LKQ, but rather difficult to follow.
HER3. 6160kc. 48.66m. Schwarzenbourg, Switzerland. Very good musical programmes from this Swiss station early morning.
HER5. 11865kc. 25.28m. Same location. Excellent in the programme for Australia and NZ, also heard in English at 5.30 am.
H. 11815kc. 25.39m. Same location. This is the new outlet reported by many readers, but badly interfered with at 5.30 pm.
Munich. 11870kc. 25.27m. Germany. This is the new outlet heard in the mornings at quite fair strength.
TAP. 9465kc. 31.70m. Ankara, Turkey. Excellent every morning, with some interesting programmes.
OLR2A. 6010kc. 49.90m. Prague, Czechoslovakia. Lady gives news in English at 6.30 am, and it is easily followed.
SDB2. 10780kc. 27.83m. Motala, Sweden. Another good Scandinavian station, which can easily be logged around 6.0 am.
PHI. 11735kc. 25.57m. Hilversum, Holland. Besides being heard around 6.0 am, have also heard it in English Fridays, at 8.30 pm.
H. 15315kc. 19.59m. Schwarzenbourg, Switzerland. New one, used to North America, and heard from before 12.30 pm to 1.30 pm.

NORTH AMERICA

13 METRES.
KNBA. 21630kc. 13.87m. Dixon, Cal. This is a new outlet and is heard from 11.15 am till 5.0 pm.
KCBA. 21460kc. 13.98m. Delano, Cal. Another new outlet now in use and heard from 8.0 am till 2.30 pm.
KCBF. 21740kc. 13.80m. Delano, Cal. This channel is used in parallel with KCBA at the same time.
KGEI. 21490kc. 13.96m. Belmont, Cal. This General Electric station can be heard from 11.0 am to 4.0 pm.
WNRX. 21610kc. 13.88m. New York. a good night this station is easily he around 11 pm.
WGEA. 21590kc. 13.90m. Schenectady, Listen for the Frank Sinatra show at pm.
WCRC. 21570kc. 13.91m. New York, This is a morning station at most lo tions, but also logged at 9 pm.

16 METRES
KNBI. 17850kc. 16.81m. Dixon, Cal. comes on the air at 11.15 am and cl at 5 pm.
KCBR. 17780kc. 16.87m. Delano, This new outlet opens up at 2.30 pm remains at good strength till closing 6.45 pm.
KWIX. 17760kc. 16.89m. San Franci Cal. Still another new outlet which op at 1.15 pm and remains good till 6.45
KRHO. 17800kc. 16.85m. Honolulu. During the early afternoon this cha comes in very well indeed.
WCBX. 17830kc. 16.80m. New York, Has improved very much and easily he every night.
WLWK. 17800kc. 16.85m. Cincinnati, O Around 9.45 pm this channel is good tertainment strength.
WNBI. 1780kc. 16.87m. New York. NBC station is used in the European gramme at night.
WRUW. 17750kc. 16.90m. Boston, M Not as loud as the other Americans on band, but heard nightly.
WGEX. 17880kc. 16.78m. Schenectady, Listen for this outlet just after midni or early in the morning.
KGEX. 17880kc. 16.78m. Belmont. West Coast GE station is excellent du the afternoon till 6.45 pm.

19 METRES
KNBX. 15330kc. 19.57m. Dixon, Another new channel for this station is heard well from 1.15 pm.
KGEI. 15210kc. 19.72m. Belmont, From 7 pm till midnight this GE sta is excellent entertainment level.
KWIX. 15290kc. 19.62m. San Franci Cal. Have only heard this station before closing at 1.15 pm.
KGEI. 15130kc. 19.83m. Belmont, Comes on the air at 8 am when it is ea heard.
KCBA. 15150kc. 19.80m. Delano, Cal. other good west coast station heard closing at 6.15 pm.
WCBN. 15270kc. 19.65m. New York. CBS station can be logged any night aro 11 pm.
KRHO. 15250kc. 19.67m. Honolulu. heard well opening 7 pm.
WRUL. 15130kc. 19.83m. Boston, M This channel carries the programme Europe around 9 pm.
WOOC. 15200kc. 19.74m. New York. other East Coast station heard aroun pm.
WGEO. 15330kc. 19.57m. Schenectady, Tune this one in around 10 pm and in the early morning.
WBOS. 15210kc. 19.72m. Boston, M This Westinghouse outlet also comes very well from as early as 8 pm.

25 METRES.
KWID. 11900kc. 25.21m. San Franci Cal. Still holding its place as one of loudest Americans on the air at night
KWIX. 11,890kc. 25.22m. Same locat Carrying the same programme, but n as loud as KWID.
KCBF. 11810kc. 25.40m. Delano, Cal. of the best on the band in the late a noon.
WOOW. 11810kc. 25.40m. New Y Another of the CBS outlets which car heard at 8 pm.
WLWO. 11790kc. 25.45m. Cincinnati. G a nice signal from this Crosley sta when it opens at 8 am.
WLWS. 11710kc. 26.62m. Same local This station carries the Latin Amer programme around 7.30 am.
WCRC. 11830kc. 25.36m. New Schedule seems to be changed, but heard it at time of writing around am.
WOOW. 1870kc. 25.27m. New York. cellent in the mornings at 6.30 am.

31 METRES
KWID. 9570kc. 31.35m. San Francisco, Reaches good level by closing time of pm.
KCBF. 9700kc. 30.93m. Delano, Cal. excellent station every night with entertainment.
KCBA. 9750kc. 30.78m. Delano. Equally strong at night and carries same programme as KCBF.
WNRX. 9750kc. 30.78m. New York, Not as loud as a few weeks ago, easily heard opening at 7 am.
WLWK. 9595kc. 31.28m. Cincinnati. This Crosley station can be heard ar 8.30 am.
WGEO. 9530kc. 31.48m. Schenectady, This General Electric station carries Latin American programme from 8 a
WCRC. 9650kc. 31.09m. New York. heard this one in the forenoons, but weak strength.

OFF THE RECORD — NEWS & REVIEWS

By JOHN MOYLE

Two fine recordings—the Schumann "Carnival" suite, and the Borodin symphony, are the highlights of recently released records. They are both splendid, vital performances.

AUDIO ARRAU, Pianist — "Carnival e, Op. 9" (Schumann). PARLOPHONE 126/8.

his is a recording of more than usual rest if not importance. The Carnival e is one of those disarming compositions h are apt to tax the resources of the t in a most disconcerting manner. It for the display of considerable imagina- on the part of the performer, and a ng for the piano to a degree required aps by no other composer except Chopin. pianist must be at one with the in- ment rather than use it to declaim or to le.

audio Arrau plays the Suite with most sual energy, not to say authority. I have ly heard the opening bars attacked with arresting force.

the same time, he is able to melt with e sudden variants of mood which make umann so much himself. Arrau's techni- ability, dexterity, and dynamic control really astonishing at times and fully uate to explore every broad or fine point he music.

re is a pianist who on his own showing youth, vigor, imagination and the courage ive them full rein. If I disagree with on one or two matters, I am prepared o so with the concession that he makes own case for the music as he sees it. here and there, I am sure you will ilm as I did, "That is near perfect per- iance."

ou will play these records again and n.

HE HALLE ORCHESTRA—Conducted by stant Lambert—"Symphony No. 2 in B or (Borodin), (7 Parts).

HE HALLE ORCHESTRA—Conducted by ence Turner—"Andantino from Diverti- to in D" K251 (Mozart). COLUMBIA .830/33.

e similarity of this music to "Prince " will be startling to those who have heard it before. The same swirling g melodies, massed orchestral division, of brass, full bass support, and contrast een full blooded romanticism and tragic ments, are all here. For that matter are found in most of the Russians of school. In it, Borodin might be con- ed a link between Tchaikowsky and sky-Korsakov.

e net effect is something nearly every- will like. And after all, we all appreci- a little full-blooded orchestral weight from to time with all our emotions underlined orchestral colors laid on straight from tube, so to speak.

nstant Lambert is one of the few Eng- hen who seem able to handle stuff like and really make it sound.

echam at least is unable to give it just abandon it demands. The Halle, too, es such music with zest.

hich is the same as saying that this is ost successful bit of work. It is rather on needles—the recording has excep- l weight—but, on a good machine, you y know that a fine orchestra has been ork.

e Mozart fills up the odd side, and pro- a striking contrast to Borodin in way.

NNO MOISEIWITSCH—Pianist—"Bar- le in F Sharp Major," Op. 60 (Chopin). EB.368.

ite a good example of the "soft" method aying Chopin, which I often think por- him somewhat falsely. One or two also are rather muddily recorded, at not as cleanly as would have been the with some other pianists I could name. ver, that's a matter of taste, but I was with the impression that the music had ully been explored.

RIAN ANDERSON — Contralto — Piano by Kosti Vehanen—"Go Down, Moses" My People Go) — "My Soul's Been ored In The Lord." HMV. EC.153.

typical style, another fine singer con- es to the latest lists. These are in with her many "spiritual" records, al- h not, I think, equal to her best, among I rate the early "Deep River." But tely worth hearing.

ELIZABETH SCHUMANN—Soprano—Piano Acc. by Gerald Moore—"Die Forelle" (The Trout), (Schubert)—"Romanze" (Vollmond strahlt aus Bergeshohen) (Fr. "Rosamunde") (Schubert), (In German). HMV. EC.152.

Sung as befits one of the finest recording soprano voices. Give me Schumann, Lehmann, and a couple of others, and I can match all the remainder put together. Of Schumann, it can be said that she touches nothing she does not adorn.

JOHN CHARLES THOMAS—Baritone—with Victor Symphony Orchestra — "Sympathy"; "That Would Be Lovely"; "Forgive" (with Hope Manning (Soprano)—"My Hero" (all from "Chocolate Soldier" (Strauss). HMV. ED.471.

Sung in the typical Thomas manner — whether you like this man or not, you must agree that he is one of the most positive vocal personalities now recording. So much so that I feel he is more at home in this type of song than in many others. There is little point in commenting on the material. The recording is full and round, a little too robust for some needles in fact. If you like lusty singing, this is it.

RICHARD CROOKS—Tenor—With Victor Symphony Orchestra—"Song of India" (From "Sadko") (Rimsky-Korsakov)—"Pourquoi Me Reveiller?" (From "Werther" (Massenet) (Both in French). HMV. EC.154.

An interesting contrast with John Charles Thomas, Richard Crooks enjoys undoubted popularity, but his singing to me seems negative. Always he is a voice producing the same inflexions, effects, and atmosphere which varies but little. You will get here just what you expected in performance and recording.

THE BOYD NEEL STRING ORCHESTRA—Soloists: F. Grinke & D. Martin (Violins); J. Whitehouse ('Cello); A. Goldsbrough (Harpsichord). Conductor: Boyd Neel. — "Concerto Grosso" No. 8, Op 6 (Handel), COLUMBIA LBDX.4/5, and "Concerto Grosso," No. 9, Op. 6 (Handel), COLUMBIA LBDX.6/7.

The Boyd Neel orchestra has long been admired by gramophone enthusiasts for its work, at times almost faultless both musically and technically. Its presence in Australia at the present time gives these records an added interest.

Handel has written some beautiful music in the Concerto Grosso form, and it is the type which the Boyd Neel is able to handle with special effect. These two are well known, played with fine precision, good dynamic effects and definition. In fact, there are so many points of approval that they automatically go into the "must" class. You can order them with confidence.

RICARDO OSNOPOSOFF—Violinist—Piano Acc. by Valentin Pavlovsky—"Peter And The Wolf"—Theme and Processional (Prokofieff, arr. Grunes)—"La Campanella" (Paganini, arr. Kochanski). HMV. ED.470.

The themes from Peter and the Wolf sound a little strange out of their context, this being the first time I remember hearing this music made use of as an arrangement. I don't know that it gains very much thereby, except to provide a vehicle for some facile playing. "La Campanella," however, shows the violinist to very good advantage. His technique is particularly clean and sure, likewise his intonation. I don't think there is a false note in the whole thing. There are one or two little bow scratches, however, which may be taken more as a compliment to the recording than anything else. A violinist who records so near the mike as this man must be absolutely perfect if he is to avoid little things of that nature becoming evident. I mention them only in passing—they do not mar a record which will sound fine, particularly if you have a good amplifier.

THE CLEVELAND ORCHESTRA—Conducted by Arthur Rodzinski—Show Boat; Scenario For Orchestra (Kern). COLUMBIA DOX.834/6.

This is a rather long type of medley on Show Boat music which will interest many. All the well-known melodies are here treated in something like the symphonic manner, to use the word in its popular modern sense. There seems to be a pronounced leaning at present towards using the orchestra in this way. It is evident in the films, of course, and probably owes a good deal to them for its popularity. There cannot be any objection to the idea, and a symphony orchestra is a combination most likely to strike a response in the minds of those who, although not prepared or ready to accept the more "classical" music, will accept it willingly if it plays something they can recognise.

It is far better to use material of this nature than to adapt standard works, frequently doing them violence in the process. It is a pity, however, to see good artists employed by the film industry to play standard works in connection with silly and unconvincing stories, obviously written to provide an excuse for playing them. The Rachmaninoff concerto is a case in point. I have just received a new recording of this, played by Rubenstein, which on one playing appears to be out of the top shelf. To hear it, however, film fans will have to reconcile themselves to a silly concoction of so-called artistic temperament portrayed in a story where alleged musicians behave in a manner unheard of in any concert hall, alive or dead. There are times when the Hollywood manner can discount many good things of this type, by associating them with goings-on calculated to make the proverbial cat laugh.

All this hasn't much to do with the records concerned, except on principle. I can take Show Boat music in almost any form or arrangement. So can most people. I thought this scenario rather good.

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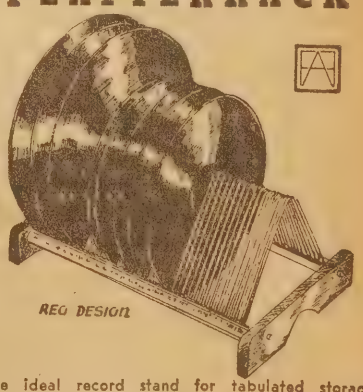

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H.M.V.

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SERVICEMAN WHO TELLS

(Continued from Page 55)

connected to a tapping on the voltage ider.

The position of this tapping is a st important matter. If it is set apply a maximum positive cathode tage of say 30 volts, assuming screen d plate voltages of 100 and 250 volts pectively, the full control possibili- s of the valve are not realised, and operation of the control depends re than need be on the short- effect of the aerial coil primary. der these conditions the operation the control near the full off posi- n is likely to be very abrupt and sy.

UT-OFF VOLTAGE

Taking the reverse instance, the tage divider tapping may be set say 50 volts, in which case the valve te current reaches a definite cut- before the shorting effect becomes dent on the aerial. In the process reducing the signal to zero, the roduction may become extremely orted.

The best voltage, depending on the ct valve type and circuit conditions, usually between about 35 and 40 ts. So, is you have occasion to reset tapping for one of these circuits, r in mind the effects on too high too low an operating voltage.

t may be mentioned, in passing, that ne circuit arrangements put the ume control directly in series with low potential end of the voltage ider, so that the maximum cathode ential is set by the magnitude of the ed current and the value of the po- tiometer. Thus, increasing or de- asing the value of the potentiometer rs the maximum cathode bias and a marked effect on the operation the control.

nyway, to get back to the set in stion. The operation of this type control is abrupt at the best of es in the vicinity of strong stations I was not happy about the set, n after the voltage divider tapping been readjusted to minimise the ortion complained of.

he aerial was a typical picture rail allation, just about enough for in- tate reception, but with more than necessary signal pickup for local ions. Realising that the set would used mainly on local programmes, I alled an ordinaary aerial knife ch to break the lead-in on the wall above the set. The receiver would s normally operate with only a le of feet of aerial wire, plus the citive effects across the switch from aerial proper. Under these con- ons, danger of overloading would slight.

ested under these conditions, the performed quite satisfactorily, and out the abrupt operation of the me control. However, I went one further and installed an earth between the set and a water pipe.

TION OF CONTROL

hen a mains receiver is operating a very short aerial, quite a lot of the signal pickup occurs through the power mains, and volume is likely to be effected by the switching on of lights or appliances. This is most likely to occur with receivers not employing automatic volume control, as in this case. Many service calls for fading effects are traceable to this cause. Installation of an earth wire minimises chance of trouble.

These remarks may be of assistance to readers whose sets are of the same general type and not already fitted with a local-distant switch.

AMATEUR NOTES—BY BILL MOORE

(Continued from Page 68)

W.I.A. NEWS

The postwar reopening of the NSW Division UHF section was held at Science House on Friday, May 9. Sydney's UHF enthusiasts were present and one interstate visitor, VK3VV.

The NSW UHF officer, C. Fryar, VK2NP, was elected chairman of the section; vice-president F/O L. Page, VK2YQ; secretary, Mr. J. Lindsay; publicity officer John Moyle, VK2JU.

General discussion centred around the future of the section and a list of frequencies of UHF stations was compiled. Future meetings will be held on the second Friday of each month, the next meeting on June 13. All UHF supporters will be welcome. The NSW WIA was very unfortunate to lose, late in April, the services of its treasurer, Basil Dale, VK2XX.

The following is a list of amateurs in NSW who act as country zone officers for the WIA. Bob Gream, VK2AFP, North Coast and Tablelands; John Traill, VK2XQ, Newcastle and Districts, Harry Hawkins, VK2YL; Coalfields District; Jack Russell, VK2QA, Western, Noel Arnold, VK2QJ, Southern Zone.

They would be very pleased to hear of the doings of country amateurs so they can supply to "Amateur Radio" a concise report of country activity.

We heard whispers of the possible resignation of the Federal president Vaughan Marshall, VK3UK, owing to pressure of business. The majority of Australian amateurs hope he will continue in the chair. Vaughan entered the RAAF from the RAAF WR and finished as G/C Director of Signals. We want an amateur with that experience in the No. 1 position in Australia.

The election of NSW Council for 1947-1948 was adjourned for one month. Sixteen amateurs have nominated to fill the seven vacancies and so have expressed a willingness to actively work for the amateur movement.

ANNUAL REUNION

The 17th Annual Reunion of the Experimental Radio Society of NSW was held at Melody Hall on May 8. The society's reunion (which incorporates the Lakemba Radio Club) was a great success.

PHILIPS RELEASE TECH. MANUAL

TO assist radio servicemen, Philips Electrical Industries have recently released the "Philips Manual of Radio Practice For Servicemen." Compiled by E. G. Beard, M.I.R.E. (Aust.), the manual contains a wealth of information in its 500 quarto-size pages.

The book is divided up into seven major sections, each one indexed in detail for ease of reference.

The first 50-page section outlines the broad principles of radio transmission and reception and is written in language sufficiently simple to be followed by a beginner in radio. Section two makes a closer study of radio receiver technique, covering all aspects from the aerial input circuit to power supply arrangements.

Radio principles and components are covered in section four, which begins with resistors and resistance and progresses right through to modulation methods, acoustics and stereophonic reproduction. The approach and compilation of these three sections of the book are rather novel and they could be treated by a student as a course in radio fundamentals and practice.

The service angle is taken up in section four with a review of service equipment and servicing methods. Despite the title of the book, this section will probably be less valuable to servicemen than the preceding technical "course," or the following sections which present a compilation of formulae, tables and charts.

There is a wealth of information in section five, and full use of the indexing is necessary to extract it all. The tables and formulae begin with resistance, capacitance and inductance and take in reactive filters, transformer design, transmission lines, valve applications, receiver tests and a variety of other subjects.

Finally, there is a section devoted to mathematical quantities and tables, some detailed information on selected modern valves and an appendix with sundry items not covered in the main body of the book.

A good investment for those who have time to study.

REFUELLING FROM THE AIR

AN idea, mooted some years ago, and the subject of little experiment since, is that concerning the refuelling of aircraft while in flight.

Large machines undertaking long journeys must carry a great weight of fuel if the journeys are to be made non-stop. On the principle that an inter-city railway train doesn't load up with enough coal for the journey before it starts, it is argued that refuelling en route is the sound way to handle aircraft traffic. The extra weight saved can be used for passengers or freight, and it would represent a considerable proportion of the total load carried.

Recently a test was made over Cherbourg in France, when a British Lancaster, with two 680-gallon tanks in its bomb bay, transferred 1000 gallons of fuel in 23 minutes.

★ ★ ★

British Honduras' former famous sponge industry is now near death because of a fungus that invaded the sponge-planting grounds in 1939 and wiped out all live commercial sponges.

BREAD—THE STAFF OF LIFE

(Continued from Page 13)

quantity of thiamine required depends on the character of other items of diet. It is also known that the greater the expenditure of energy, the more thiamine will be needed.

The larger the amount of sugar or starch which the body consumes, the more thiamine is needed. It is thus that the eating of white bread or potatoes that have been cooked in water causes a cycle of events which is not appreciated by the human body. In the cooking of potatoes in water, the thiamine is dissolved and thrown away with the water. Likewise the thiamine is removed in the manufacture of white bread. As white bread and potatoes are practically all starch, it follows that the very vitamin required for th proper assimilation of them is re moved before consumption. How sill

The vegetables which contain thia mine are normally eaten after cookin in boiling water. When the water use for this purpose is made into soup similar beverage, the chance of losin the thiamine is rather remote, but whe as usually happens, the water goes dow the drain, it is the sewer rats tha benefit from our culinary efforts.

Thiamine is not readily stored by th human body, and this makes it all th more necessary why a supply of thia mine should be taken in every da Perhaps some of our common everyda complaints, such as muscle pains usual attributed to rheumatism. languidne attributed to Mondayities. the nervo complaints, may be caused by a lac of thiamine. It is the most delicate all the vitamins, and as mentione can be lost through cooking in wate destroyed by heat. Various diseas call for an increase in the body's thia mine requirement. Intestinal con plaints, malaria, tuberculosis and ove indulgence in alcohol are some of the Whether thiamine is a cure for hang-over, I am unable to say.

Of recent years the question of "fo tifying" white bread by the artifici addition of the vitamins has ma considerable progress.

Experience in America has prov the futility of trying to get the pop lace to revert to brown or wholeme bread. Considerable sums of mon have been spent by both Governme and manufacturers without avail.

Eaters must have their white brea come what may, and nothing will sh them from that attitude.

A happy solution was the introdu tion of thiamine and other vitami to the bread in order to bring it to the nutrient value of the whol meal bread. This has proved rath successful. So far in Australia it h not gained great favor with manufa turers for various reasons. No dou some day will see the practice inst tuted.

It would appear then that we ha in fact made little progress with t manufacture of bread since the Sto Age.

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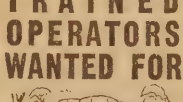

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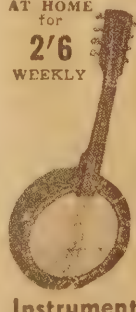

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ANSWERS TO CORRESPONDENTS

NDER THE PERSONAL SUPERVISION OF THE TECHNICAL EDITOR

M.W. (Eastwood) sends in a crystal cir- for which he makes special claims.

Many thanks for your letter and for description of the crystal set. We will ably make use of it in the "Reader t It" page.

B.M. (Mayfield, NSW) asks some ques- s about a 6L6 amplifier.

When operating these valves in parallel -pull it would be desirable to take fairly nsive precautions against parasitic os- tion. To this end we would suggest con- ing non-inductive resistors of a few dred ohms in series with each grid lead mounted right at the socket. The screens ld also have 100 ohm non-inductive sup- sor resistors by-passed at the end remote screen by .001 mfd. mica condensers. ay or may not be necessary to include es in the individual plate leads. Your ulations of power output only holds at uencies where voice coil impedance is tly 2.3 ohms and where the load it pre- s is substantially resistive. In a al loudspeaker this might occur only ne critical frequency. The only sure is to substitute a large 2.3 ohm resistor he voice coil and measure the RMS vol- across it at the point where overload st beginning to be apparent on a CRO. rnatively you can install the correct re- ve load directly across the primary of transformer and measure the audio volts loped across it.

D. (Gilgandra, NSW) writes in apprecia- of "R. and H." and has built up the tagrid Four" with pleasing results.

We had built recently a set similar to "Pentagrid 1946" and even went so far o prepare an article on it. To date we not had a chance to publish this article, may do so at least in brief before long. have also considered producing a set gned especially for long distance broad- reception to which other coils may be d, thus making an all-wave receiver. At moment we could not say when or if ils will be published. Your scheme for inged screw-driver would probably work ight although we feel that a much simpler ument could be made by placing an e on a normal screw-driver with or with- removable bits. Many thanks for your rest and suggestions.

A.S. (Rosetta, Tas.) tells us of his suc- with "Simple Simon."

Many thanks for your appreciative re- s about "Radio & Hobbies." We are glad ote you are doing so well with your ple Simon."

G.L. (Elimbah, Q.) reports having built a three-valve portable set with good re- .

We are glad to note that the portable is g so well and also that you found the le on making a pickup arm handy. We that your "1942 Pentagrid Four" cannot operating very efficiently as, by no ch of imagination could the rod aerial your portable be more efficient than the rted "L" type. There is no particular ction to using the two loudspeakers our radiogram, but the best arrangement the output transformers would depend he load requirements of the set. If the needed is of the order of 15,000 ohms, could connect an 8000 and 7000 ohm ker in series. Alternatively, for a load bout 8000 ohms, use a single 15,000 ohm sformer and feed the two loudspeakers arallel from its secondary winding.

P.P. (Edithburg, SA) sends in an ad- sement for "Radio & Hobbies" and says ooks forward to seeing each issue as it ars.

Thanks for your encouraging remarks you can rest assured that plenty of les will appear in the future of in- st to amateurs.

F. (St. Peters, SA) requests information he type 45 and 24 valves.

Space does not permit us to list charac- tics of these valves in these columns we suggest that you write for a valve chart to the Amalgamated Wireless Valve 47 York-street, Sydney, enclosing three- e in stamps to cover postage. Alterna- ly you could address your request to ps Electrical Industries, 69-73 Clarence- t, Sydney. Glad to note that the 1Q5 erforming well, but if you find that lation is too fierce with 45 volts applied he plate, you can operate it quite simply a lower voltage, whichever gives the best ound results.

E.W.E.B. (North Sydney) writes in appreciation of the recent articles on short-wave receivers and suggests that we should publish coil data and details of a fairly elaborate short-wave converter to couple ahead of a broadcast receiver.

A. Thanks for your letter and glad to note that you appreciated the articles and particularly the circuit, of the "Communications Nine." Just at the moment we cannot make any promises about the converter but there is no particular reason why you should not adapt for the purpose the front end of the "Communications Nine" receiver. To allow for an intermediate frequency of 1500kc. you could reduce by five to 10 per cent. the number of turns on the oscillator coils.

J.F. (Northbridge, NSW) writes to express his appreciation of "Radio & Hobbies" and the circuits published from month to month. He mentions particularly the "Little General," "Amateur Junior," "1946 Advance," "1946 Sandard," and the "Pentagrid Four."

A. Your success with all these circuits is indeed encouraging to us and we trust that we will be able to keep up the good work for many years to come.

A.D. (Brisbane) says he would very much like to see a series of articles on television and asks about the method of relaying television programmes cheaper than that employing coaxial cable.

A. Many thanks for your letter and for your views on the subject of television. It seems that the future of television relays will be bound up very intimately with high frequency radio links which can be arranged to carry a variety of radio material simultaneously. These link a series of highly directional radio transmitters and receiver installations, located at strategic elevated points, which carry the programme material from the source to the transmitting stations. The relay installations can be automatic in operation and unattended for most of the time.

A.O.T. (King Island, Tas.) asks whether a 20-meter doublet aerial could be tuned to be resonant at the international broadcast bands on 19, 16 and 13 meters.

A. It is possible to tune aerials to other than their natural resonant frequency by means of condensers and loading coils. Where an aerial is to be resonated at many different frequencies a considerable amount of design work would be necessary to evolve an aerial tuning unit and to calibrate it subsequently so that it could be reset to the required frequency without delay. It may or may not be worth while to erect your aerial so far from the receiver or transmitter and only experiment can establish the fact one way or the other. You can expect considerable attenuation over a 360-foot transmission line and the loss may exceed that resulting from a less favorable placement of the aerial.

V.J.E. (Carlton, Vic.) advises of a change of address and asks about the "1946 Little General."

A. Your change of address has been noted and you should have no further trouble about receiving the issues. The "Fireside Five" cabinet was a standard production model which you should be able to obtain through your normal radio supply house. It was manufactured originally by the Western Cabinet Co. The "Serviceman Who Tells" series has been recommenced and this should prove interesting to you. The use of a 6K8G converter in place of the 6J8G should not affect the gain of the "Little General" receiver, especially as you have made changes in the circuit to apply correct operating voltages. Grid current with a standard coil would be a little on the high side but not enough to make any drastic difference in the sensitivity. It seems that your trouble is elsewhere in the circuit. Rather than suggest any particular text book to interest you, we feel that you would do better to pay a visit to McGill's Agency or other technical bookseller in Melbourne and have a look through their shelves to see what is available at the right price.

G.B. (Leichhardt) has an old-style TRF receiver and wonders whether it can be brought up to date.

A. It is problematical whether it is worthwhile spending time and money on an old set of this style, especially if the existing valves are not 100 per cent. Valves like the 2A7, 2A6, 2B7, &c., necessary to convert the receiver to a superhet with AVC, are few and far between, while there is a difficulty in providing the correct filament voltage for the modern octal-based equivalents. The job might be tackled by a keen radio experimenter but, for someone who merely desires to obtain a new domestic receiver, the better plan is probably to buy a complete new kit of parts and retain the old receiver as a second set in the home. Or, if you plan to buy a new receiver, the old one can be traded in for a few pounds.

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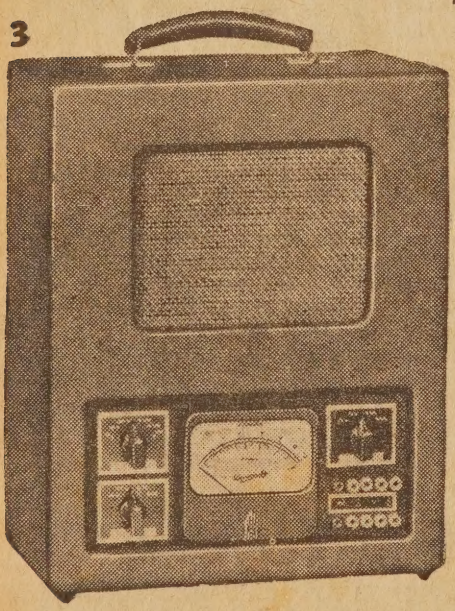

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ANSWERS TO CORRESPONDENTS

(Continued from Page 77)

W.J.S. (Sans Souci, NSW) says he knew nothing about radio in June, '45, but subsequently built up "Monty" and has since adapted it for loudspeaker reception and for use on the short-waves with a plug-in coil. With this set he has logged an impressive number of short-wave stations.

A. We were interested to read of your success with this little set and trust that it will be the first of many successes for you. You may not be able to tune to the 19 and 16 or 13 meter bands with the present coil, either due to its having too many turns on the grid winding or to improper operation of the reaction control. If you tune the 20-meter amateurs with the condenser almost right out of mesh, try winding up another coil with fewer turns on both windings to tune to the higher frequencies. If the filament winding for a 47 is not directly centre tapped, you can connect a centre tap resistor across the winding, installing the bias network between the chassis and the centre of the resistor. We suggest that you write to the amateur in question, asking him whether it is convenient to show you his equipment. Thanks for your kind remarks.

E.C. (Gosford, NSW) has a 1933 Standard receiver and now wishes to replace the type 59 valves, which are no longer available.

A. If you cannot obtain type 59 valves, the nearest replacement is type 2A5, which will operate under the same conditions but requires a 6-pin socket. Failing the 2A5 valves, you can change the sockets to accommodate either type 42 or 6F6-G and install a small auto transformer to provide the necessary 6.3 volts for the heater supply.

W.R.L. (Epping, NSW) says he has had excellent results from most of our one and two-valve sets and also from the "Little General."

A. Thanks for your report, W.R.L., and for your encouraging remarks in regard to "Radio and Hobbies." The two-valve circuit sketched out is a fairly conventional arrangement except that the output valve should have a bias of about -3 volts on the grid. This should improve tonal qualities and effect a big saving in plate current.

R.B. (Coolamon, NSW) sends in his subscription and reports good results from a "Little Jim 2" which has been built up on a small chassis.

A. Glad to note that your little set is going well and thanks for the subscription to "Radio and Hobbies." Without examining the circuit in detail, the meter in your possession appears to be an ordinary volt and resistance meter with an internal resistance of about 500 ohms per volt. This figure is lower than usual but the instrument would nevertheless be quite a useful one.

N.E.M. (Plympton, SA) reports that some trouble in his PA-5 amplifier has cleared up of its own accord and that the amplifier is now operating satisfactorily.

A. Glad to note that the amplifier is okay now and, as you say, you will have to wait for another "spasm" until the faulty part can be identified. On the other hand, you may have made an inadvertent wrong connection to the microphone or pickup, which has been corrected on the next occasion.

L.V.L. (Hawthorn East, Vic.) has a transformer with 2.5 volt and 4 volt filament windings and asks how it could be used with 6.3-volt valves.

A. All you would need to do would be to connect the 4-volt winding in series with one of the 2.5-volt windings, which will give you 6.5 volts—quite near enough for the purpose. Connect one end of the 2.5-volt winding to one end of the 4-volt winding, taking the leads to the filaments from the two remaining terminals. If the valves do not light to full brilliance, simply reverse the leads to one of the windings.

T.A.N. (Lower Mitcham, SA) reports that he is getting very much better results since he followed our advice and had his "1941 Portable" correctly aligned.

A. Thanks for your subscription and we are pleased to note that the set is now operating as it should.

G.A.E.M. (Marjimup, WA) sends in a suggested set of rules for a DX Competition.

A. Many thanks for your letter and your interest in the subject, but it so happened that the rules for a DX Competition had been drawn up for publication in the May issue. You will doubtless have seen these already in the short-wave notes.

J.M. (Brisbane, Qld.) asks how he can use a loudspeaker on his "Little Jim's Mate" receiver which works very well on earphones.

A. You can only expect loudspeaker reception from a one-valve set on the strongest local stations, unless you are prepared to add an audio amplifier stage. However, there is no harm in experimenting to see what results you can obtain. Buy a 5in. loudspeaker fitted with a 25,000 ohm input transformer and connect it in place of the earphones.

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EXCHANGE: Air Rifle and Electric motor or Blue Point Morse Code set valued at £2/10/-. For Camera in good order, write stating all particulars. **P. Rudd, "Sunny Side," Bellata, NSW.**

EXCHANGE: A cathode ray oscilloscope using a 913 C.R. tube—similar to "R. & H's" scope—housed in nice metal case, for a good electric gramophone motor, or will sell. Apply **155 Riversdale-rd., Camberwell, Melb. WF7448 for details.**

FOR SALE: All parts for Pentagrid Four, £15; 2 x 8mf, 7/6; single gang H condenser, 10/6; 6-pin Syne. Vibrator, 27/6 Astor battery Mickey Mouse set as new, £15. **K. W. Peterson, The Head, via Killarney, Q'land.**

FOR SALE: Rola G12 P.M. 5000 ohms C.T. **58 Cecil-st., Gordon, N.S.W.**

FOR SALE for reasonable offer, FS6 transceiver complete and in perfect order. **N. Boase, 36 Victoria-road, Malvern, Vic. UL6241.**

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FOR SALE: Amplifier. 4 valve. Good condition. 30 latest dance records. Very cheap. **C/o XL2021 (Sydney).**

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FOR SALE: Radio with 4 miniature valves, condensers, coils, etc. **Mr. W. E. Williams, 14 Hurlstone-ave., Hurlstone Park, N.S.W.**

FOR SALE: Tiny Tim 3-valve, 6J7G, EL3NG, 5Y3G. Less speaker. **S. McKaysmith, 36 Brush-rd., Eastwood. WL1829.**

FOR SALE: W. Electric 725A Magnetrons, 3 centimeter, Brand New. Best offer. **Box 240, Hamilton, Vic.**

FOR SALE: 1941 portable, new, complete needs adjustments, £11. Also 1941 "Little General" new (broadcast) minus speaker, £10. Particulars. **J. McKenzie, Park-ave, Portland, N.S.W.**

FOR SALE: "R. & H.", Jan., 1945 to March, 1947, complete, £1/10/-, plus postage. Practical Mechanics, July, 1945 to March, 1947, complete, £3, plus postage. Good condition. **I. Ebelt, 5th. Kilkerran, Y.P., S.A.**

FOR SALE: 240-v A/C Motors, 1/10 h.p., also 1/20 h.p., £5. Suitable sewing machine, coil winder, etc. **R. Chick, 36 Huntley's Point-road, Huntley's Point, N.S.W.**

FOR SALE: A one valve set for beginners. Just built, price £2/13/-. July, 1946 "R. & H." **C. Raymond, 3 Villiers-st., Kensington, N.S.W. FF1832.**

FOR SALE: 5in. dynamic speaker with 5 valve set. Parts include, valves resist. condensers, Mag. P.U., 100 microamp meter, part or whole. Offers. **C/o XL2021 (Sydney).**

FOR SALE: Generating set, Villiers single cylinder 4-stroke, 1/3 h.p. engine, coupled to a self-exciting alternator, 350 watt. Complete with spare parts. Output, 230 volts, 1.52 amps. What Offers? **D. St. Ruth, 98 Oramzi-road, Girraween, N.S.W.**

FOR SALE: Crystals, Genuine American, mounted 7006.67 kc, £2/10/-. Other freq. from 1700 kc to 6900 kc all suitable for regrinding, £1/10/- each. **K. Falkoner, 31 Wakefield-st., Glenferrie, Vic.**

FOR SALE: Magnavox 9in. fine screen speaker. **Ring JW1452 after 6 p.m.**

FOR SALE: Calstan A.C.-D.C. Multimeter and set analyser. All ranges. Accessories. Perfect order in leatherette case. £9. **R. Wheeler, 199 Iodide-st., Broken Hill, N.S.W.**

Readers wishing to buy, sell or exchange goods are invited to insert an advertisement on this page. The cost is 9d. per line; minimum charge 2/3. Approximately 6 words to a line. Advertisements for the next issue must reach our office by WEDNESDAY, JUNE 4. Dealers' advertisements not accepted.

FOR SALE: Little General, out of order. Also quantity radio parts. Mostly new. £20, must sell. **Cooper, Park-st., Peakhurst, N.S.W.**

FOR SALE: 4 doz. Brand New Valves in unbroken cartons, including 1.4v, 2v, and 6v. Octal, pin and Philips bases All popular types Sell as whole or separately below costs. Offers. **Box 101, P.O. Stanthorpe, Q'land.**

FOR SALE: Bendix 8-valve communications receiver, 2-20 MCS, 240v A-C Also several crystals with holders, 4-6 MCS, 10/- each **HAVYATT, 264 New South Head-road, Edgecliffe, N.S.W. FM6015.**

FOR SALE: Genemotors, 24v in, 600v 200 M.A. out, £6. 24v in, 300v, 200 M.A. out and 150v 10M.A. out (double winding), £5. 18v in, 450v 50 M.A. out, £2. 12v in, 450v 50 M.A. out, £2. **Burke, 9 Henry-st., Ashfield, N.S.W.**

FOR SALE: Electric Steel Guitar "Cressy" make with volume and tone controls. 1 4-watt vibrator powered amplifier, 1 hand microphone. Mike, Guitar and Amplifier complete, price £34 or near offer. Really worth it. **Box 43, Corryong, Victoria.**

FOR SALE: One Lathe Bench and foot treadle suitable for wood or small metal lathe or jig saw. Big flywheel, approx. 56lb., 22in. dia. Three Vee Belt Pulleys, 16in. dia., 12in. dia., and 4in. dia. one V Endless Belt, Complete, £4/10/-. **Call or ring LF3775 after 6.30.**

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FOR SALE: D104 Crystal Mic, Unused, clearing stock, £7. University Senior Multimeter with carrying case, £10. University Test Speaker, £12. Master B-Battery Tester with Leather Carrying Case, £7. University Test Oscillator, £11. All Instruments 1946 Models. **C. Everdell, Gleneagle. Beaudesert Line, Q'land. 'Phone B'dst. 136R.**

FOR SALE: "Duplex Single" one valve wireless, using 1D8GT, complete with batteries and phones, £5/15/-. Torpedo and Ellipsoid microphones, mike stands (floor and table), parts for one valve set. **M. J. McIver, 205 Drummond-st., Sth. Ballarat.**

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FOR SALE: New Philips DR106 transceiver complete with mic., speaker and headphones. Calibrated 50-54 mc. 1 auto key. Filter condensers 4 mfd. 1000 volt. Heavy duty resistors and condensers. Filter chokes. Valves, 1v. 5U4, 5X4, 6AC7, 6F5, 6Q7. Filter chokes and other miscellaneous parts suitable for amateurs all above reasonably priced. **Wilson, XB4427.**

FOR SALE: One Army type No. 19 Transceiver Genemotor. Good condition. One 24v input 1.9 amps. Output 250v at 100 mill. Dynamotor. One A.T.R. DC/AC Inverter 6v input 220 A.C. output. What offers? **F. H. Shannon, Tamborine Village, Q'land.**

FOR SALE: Valves 22/6 each, metal new 12C8, 122R7, 12A6, 12SK7, 2 12v. Synch, VIB gas filled, £1 each. Never used. 1 50 V/A meter calibrated in ohms, volts, AC/DC z ohms inductance henries, cap micro farads, power level, electrolytics good, price, £4/10/- New. **Apply J. Meeson, Plant-st., Ch. Towers**

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